THE PREVALENCE AND CORRELATES OF DISORDERED EATING BEHAVIORS AMONG CHINESE ATHLETES IN HONG KONG

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Woo Mei Sum

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撮要

這個研究目的在調查香港華裔運動員的飲食實況及有關的心理因素。參加今次研究共有二百四十名運動員。他們分別填寫 Eating Disorder Inventory (EDI)、Eating Symptom Checklist- Revised (ESC-R)、Competitive State Anxiety Inventory-2 (CSA-2) 三份問卷。參加者同時亦分作四個類別以供分析：１）性別（男／女）２）等級（精英／非精英）３）運動類形（體形-體重主導／非體形-體重主導）４）比賽前焦慮程度（高／低）。研究結果指出女性，精英，比賽前焦慮較高，運動類形非體形-體重主導的運動員，相對男性，非精英，比賽前焦慮較低，運動類形以體形-體重主導的運動員，飲食／體重控制方面的病態都較爲嚴重。大專運動員與非運動員比較，前者在 EDI 所顯示飲食／體重控制問題也較爲嚴重。在被訪者中，只有一位運動員所報告的病徵達致暴食症的程度〔男性: .9%, 女性: 0%〕。研究結果同時亦顯示某些飲食／體重控制問題在運動員當中也是很普遍的－暴食〔40.4%），吃低脂肪食品（41.6%），過度運動（ 41.6%）和節食（37.1%）。至於一些較極端的飲食／體重控制如禁食，扣喉，使用瀉藥／利尿素，服用減肥藥物之百分比則保持於５－９％之間。男性運動主要以“減肥有助出色表現”作爲減肥理由；女性運動員則主要以“減肥有助美態”作爲她們減肥的理由。最後，我們也會就中西文化於飲食／體重控制方面的病態差異作出一些討論。

ABSTRACT

This study examined the prevalence and correlates of disordered eating behaviors among Chinese athletes in Hong Kong. Two hundred and forty two athletes completed Eating Disorder Inventory (EDI), Eating Symptom Checklist- Revised (ESC-R) and Competitive State Anxiety Inventory-2 (CSAI-2). Subjects were subdivided by: (i) sex (male vs. female); (ii) rank (elite vs. non-elite); (iii) sports type (shape/weight dependent vs. non-shape/weight dependent); and (iv) competition anxiety level (high vs. low). Results suggested that female, elite, non-shape/weight dependent and high competition anxious athletes were more at risk for developing disordered eating attitudes and behaviors was higher than male, non-elite, shape/weight dependent and low competition anxiety athletes respectively. Compared to Chinese college students, athletes showed elevated scores on important psychological measures of EDI. Only one athlete met the criteria of Bulimia Nervosa (male = .9%, female = 0%). Findings indicated that binge eating (40.4%) and the use of less extreme forms of weight control methods including eating low fat food (41.6%), excessive exercising (41.6%) and dieting (37.1%) were popular among the athletes. Extreme forms of weight control methods including fasting, self-induced vomiting and the use of laxatives/diuretics or diet pills/tea (5-9%) were rarely used. Male athletes attributed the "pursuit for performance excellence" whereas the female athletes attributed the "wish for aesthetic ideals of beauty" as the most important contributing factors to their weight control. Cultural differences over the prevalence and symtomatology of clinical and subclinical eating disorders were discussed.

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CHAPTER ONE: INTRODUCTION

Eating disorders (EDs) have been found to be quite prevalent among athletes in the Western world (Burckes-Miller & Black, 1988; Sungot & Borgen, 1993; Sungot-Borgen & Corbin, 1987). Environmental pressure stemmed from sport environment towards maintaining an optimal weight for athletic performance has been suggested to play an important role in the development of disordered eating (Chopak, 1991). Unlike non-athletes having EDs, athletes who have or are predisposed to have EDs have difficulties which are complicated by a sport environment that may overemphasize performance, and demand an ideal body size, shape, or weight. The sport environment may not only precipitate or exacerbate an existing eating disorder, it may also "legitimize" it.

Moreover, many personality traits that are characteristics of individuals with EDs such as driven quality about exercise and weight control, perfectionism, competitiveness, ability to withstand pain or discomfort, and the need for high achievement are also the characteristics found in good or elite athletes. These qualities may bring upon excellence in athletic performance, but they also place an individual at risk for EDs. Nevertheless, whether those people with traits of EDs gravitate toward athletics or those characteristics being promoted in a sport environment predispose one to EDs is hard to determine. Or there simply exists surface similarities in the characteristics between the eating and weight concerned athletes and ED patients.

Prevalence of Eating Disorders Among the Athletes:

General Issues

While there is a growing concern of problems of eating disorders among athletes in the 80s and 90s, there is a lack of large scale epidemiological study of EDs in the athletic population. Besides, the use of different EDs definitions, research methodologies and sample compositions have made the prevalent rates of clinical eating disorders among athletes vary widely.

Measures of EDs can roughly be classified into self-report questionnaire surveys, two stage screening (self-report questionnaire and clinical interview), clinical interviews, case registrations and hospital record studies. As self-report questionnaire surveys are relatively more economical and efficient in assessing problems with a large number of subjects, it has the greatest appeal to most researchers in the field.

Clinical and Subclinical EDs

Generally, eating disorders can be understood as a continuum from normative concerns about body weight and shape to diagnosable eating disorders (Button & Whitehouse, 1981). Other than clinical cases, alarming figures of "subclinical" disordered eating syndromes such as preoccupation with food, obsessive thinking about weight, disturbed body image and the use of pathological weight control methods are identified as important entities in studying EDs. Among the weight control methods, self-induced vomiting, fasting, use of diuretics, laxatives or diet drugs are generally taken as pathological weight control methods.

Categorizations of the Field Studies

Previous research that study EDs among athletes can broadly be classified into groups of two: (i) Mixed Sports Group - studies pooling various types of sports as a group for statistical analysis, and (ii) Single Sport Group - studies including only one type of sport for statistical analysis. In the current literature review, both Mixed Sports and Single Sport Groups, problems at clinical and subclinical level, would be systematically presented.

Prevalence of Eating Disorders Among Athletes In Mixed Sports Group:

At Clinical Level

Based on the Diagnostic and Statistical Manual of Mental Disorders III (APA, 1980), Burckes-Miller and Black (1988) developed questionnaire "Eating Habits for Athletes" (EHA) and surveyed 695 athletes from 22 colleges and universities. Three percent of the subjects (4.2% female and 1.6% male) met the criteria for Anorexia Nervosa (AN) and 21.5% (39.2% female and 14.3% male) met the criteria for Bulimia Nervosa (BN).

Sungot-Borgen (1993, 1994) used a two-stage screening and reported a lower prevalent rate of EDs. Elite female athletes in Norway (N = 522), representing 35 sports were the subjects. Using the Eating Disorder Inventory (EDI), 22% of the athletes were classified as "at risk" (Drive for Thinness $\geq$ 15, and Body Dissatisfaction $\geq$ 10) for developing EDs. Subsequent clinical interviews of those "at risk" indicated that 18% of the athletes were found having EDs, in which 1.3% and 8% of them suffered from AN and BN respectively. Guthrie (1991) surveyed a sample of college male (N = 158) and female athletes (N = 226). Fourteen percent (male = 17.1%, female = 12.4%) of them reported having an ED at the time of the survey.

Taking the studies together, about 1.3% to 4.2% of the female and 1.6% male athletes meet the criteria of AN. Compared to AN, the prevalence BN is higher, about 8% to 39.2% female and 14.3% male. For mixed EDs, the prevalence ranges from 14% to 18%.

At Subclinical Level

Research indicate that 30%- 41% of the female athletes and 16 % of male athletes reported using at least one of the pathological weight control methods (Black & Burkes-Miller, 1988; Overdorf, 1994; Rosen, McKeag, Hough & Curley, 1986). Whereas comparing only 23% of college women and 9% of college men (Zuckerman, Colby & Lazerson, 1986). Apparently,

college athletes are more apt to use pathogenic weight loss methods than their fellow college students. Besides, about 41% (Female = 42.4% ; Male = 40.7%) of the athletes from a variety of sports reported having binge eating tendencies (Guthrie, 1991).

Prevalence of Eating Disorders Among Athletes in Single Sport Group:

Aesthetic Athletes:

At Clinical Level

Athletes in aesthetic sports such as diving, gymnastics, dancing, and figure skating which have strong emphasis on leanness or weight are identified to be more prone to develop EDs. Garner, Garfinkel, Rocket and Olmstead (1987) surveyed 35 female ballet dancers and followed them up for 2-4 years. At follow up, 26% and 14% of the subjects reported having AN and BN respectively. Hamilton, Brookes-Gunn and Warren (1985) surveyed 55 white and 11 black female dancers. Fifteen percent of the white dancers reported having AN and 19% reported having BN but none of the black dancers reported having AN or BN. In sum, about 15%- 26% and 14- 19% of white female ballet dancers reported having AN and BN respectively. Unlike athletes in mixed sports group, prevalence of BN is lower or closed to AN in the aesthetic athletes.

Brooks-Gunn, Warren and Hamilton (1989) surveyed 55 female dancers and found that 33% of them had had AN or BN in the past. Sungot-Borgen (1993) grouped divers, figure skaters, gymnasts, rhythmical gymnasts and sports dancers into an aesthetic sports group (N = 64) and found that 35% of the subjects were having EDs. In sum, without the specification of EDs subtypes, these two studies gather a life time prevalent figure of 33% - 35% for aesthetic athletes found having AN or BN.

At Subclinical Level

The problems of subclinical EDs among aesthetic athletes are also rather serious. Up to 74% of the gymnasts surveyed admitted the use of at least one of the pathogenic weight-control techniques. Compared to athletes of other sports types, gymnasts reported the highest prevalent rate in the use of pathological weight-control methods (Petrie, 1993; Petrie & Stoever, 1993; Rosen et al., 1986; Rosen & Hough, 1988). Petrie (1993) even commented that disordered eating might be a "normative" behavior in this population.

Prevalence of Eating Disorders Among Athletes in Single Sport Group:

Weigh-In Athletes:

Athletes participating in sports such as judo, wrestling, horse racing and karate that require athletes to weigh before competition are also identified as high risk group for EDs. It would be important for athletes to meet the weight-class requirement by losing weight since competing in a higher weight-class category would be less advantageous.

At Clinical Level

Sungot-Borgen (1993) indicated that clinical level of EDs among weigh-in female athletes were rather severe. Among the 41 weigh-in female athletes interviewed, 27% of them reported having EDs, the prevalence surpassed all other sport groups except aesthetic (34%).

At Subclinical Level

The majority of the jockeys reported having food avoidance, abusive use of saunas, laxatives, diuretics and appetite suppressants and frequent bingeing (King & Mezey, 1987). Many reported having emotional problems such as moderate level of guilt and tension

concerning overeating during the racing season. However, due to the small sample size (N = 10) and low response rate, the findings may not be able to represent the whole jockey population.

Hansen (1978) found that rapid weight loss up to 20% of their pre-season weight in the few days prior to the official certification weigh-in among the wrestlers were common. Steen and Brownell (1990) also noted that 63% of the college wrestlers and 43% of the high schoolers had strong preoccupation with food during competition seasons, compared to less than 19% and 14% when off season. Seemingly, competition season plays a significant role in the eating pathologies (weight loss and food preoccupation) of the weigh-in athletes.

The adoption of pathological weight control and bingeing are popular in the weigh-in population as well. About 32% of the female weigh-in athletes were found using one of the pathogenic weight control methods (Sungot-Borgen, 1993). As for binge eating, about 41% - 52% of the college weigh-in athletes reported eating with the loss of control (Steen & Brownell, 1990; Thiel, Gottfried & Hesse, 1993).

Prevalence of Eating Disorders Among Athletes in Single Sport Group:

Normal Built Group:

Sports such as volleyball, tennis, cycling, long-distance running and swimming generally do not have *explicit* weight restrictions or emphasizes on leanness are classified as normal built or non-aesthetic group (Sungot-Borgen, 1994). Generally, studies indicate that athletes belonging to the normal built sports group are at lower risk in developing eating disorders than their counterparts who are more demanding on their appearance and weight (Sungot-Borgen, 1993; Sungot-Borgen & Corbin, 1987).

At Clinical Level

Sungot-Borgen (1993) found that 14%, 20% and 12% of the female athletes in technical (e.g. golf, high jump and rifle shooting), endurance (e.g. cycling, long distance running, and swimming) and ball game sports (e.g. badminton, soccer and tennis) reported having Eds respectively. Compared to the aesthetic (35%) and weigh-in (27%) sports groups, the prevalence of EDs was much lower in the normal built sports group (technical, endurance and ball games).

At Subclinical Level

With the cutoff of 14/15 in EDI (Garner, 1991), about 6%- 17% of the athletes doing sports not emphasizing leanness were "pathologically preoccupied with weight" (Sungot-Borgen & Corbin, 1987; Guthrie, 1991). Dummer, Rosen, Heusner, Roberts, and Counsilman (1987) surveyed male and female adolescent competitive swimmers. Fifteen percent of the female and 4% male swimmers reported using pathogenic weight control techniques. The prevalent rates were relatively lower when compared with the female aesthetic (73%) and female weigh-in (32%) athletes (Sungot-Borgen, 1993). As for female runners, Rosen, et al. (1986) found that 8 out of 17 distance runners in their study practised at least one pathogenic weight control methods.

Controversial Findings:

In Mixed Sports

Findings generally reported a greater array of disordered eating and attitudes among athletes than non-athletes (Kennedy, Ravelski & Dionne, 1994; Overdorf, 1994; Sungot-Borgen, 1993; Zukerman, Colby & Lazerous, 1986). Nevertheless, inconsistent findings with some showing no differences and some showing lower rates of eating pathology for athletes were evident. (Davis & Cowles, 1989; Warren, Stanton & Blessing, 1989; Wilkins, Boland & Albinson, 1991).

Warren et al. (1989) administered EAT and EDI to 74 female athletes from a variety of sports and 52 college female non-athletes. Findings indicate that typical college female athlete fell into the normal range with regard to body mass and eating patterns. Compared to non-athletes, subgroups of athletes in the sample were even found to be at slightly less risk for body dissatisfaction. Davis and Cowles (1989) included control group female university students (N =64), thin build athlete group (N = 64, e.g. gymnastics & ballet) and normal build athlete group of (N = 62, e.g. basketball & sprinting) female athletes as subjects. Similarly, thin built athletes in the sample did not have EDI scores that were significantly different from the non-athletes control group.

These findings are not totally absurd as Sungot-Borgen (1993) noted that athletes tended to underreport whereas non-athletes tended to over-report symptoms. In fact, it is the problem faced by most researchers using self-report questionnaires as items tapping on participants' internal state can easily be influenced by one's subjective interpretation. In addition, it is possible that subgroups of athletes may be relatively more health conscious and contribute to the non-significant difference on the psychological measures of EDs.

In Aesthetic Sports

Harris and Greco (1990) failed to find significant differences between female gymnasts (N =28) and the control group (Rosen, Silberg & Gross, 1988) in the scores of EDI. The only reported significant difference was lower score in the subscale Ineffectiveness for the gymnasts than the adolescent girls. Holderness, Brooks-Gunn and Warren (1994) recruited 56 dancers and 50 non-dancers who participated in a longitudinal study of the effects of decreased bone density as subjects. Similarly, they also failed to find significant differences between dancers and controls in the EDs prevalence despite the use of two-stage screening for diagnosis.

The absence of disordered eating pathology among gymnasts and dancers in some studies can be explained by the fact that individuals with ED often accompanied by a deterioration of health condition can hardly sustain the intensive strength and endurance training. Hence, athletes whose disorders fall within the severe clinical range may have already been excluded from the sports.

In Normal Built Sports

Among the normal built group, findings of eating disorders of long distance runners are most equivocal. Two case studies on male long-distance runners (Katz, 1986) have revealed the development of anorexia nervosa only after the subjects' participation in more intense running. Sungot-Borgen (1993) also found that the prevalence of EDs in middle/long-distance runners was more than other athletes in the endurance sports group.

A number of studies, however, found that runners' abnormal eating attitudes and incidence are no more than in the general population (Nuderman, Rosen & Leitenberg, 1988; Siegel, Stewart & Barone, 1990; Warren et al., 1990; Weight & Nokes, 1987). Klock and DeSouza (1995) joined the debate and remarked that effect of menstrual status among female runners was important in the investigation of EDs. They found that subgroups of amenorrheic runners scored in the extreme range on depression and eating disorder measures, suggesting the heterogeneous nature of the runner population.

These findings further denote the complication in classifying long distance running (aesthetic vs. normal-built sport). Despite the lack of explicit or rigid requirement, a slender body shape or lower weight may be believed by most runners to be necessary for optimal performance. This may explain why Davis and Cowles (1989) simply group long distance runners under the thin-built sports group in their study.

Conclusion

In sum, these findings reflect the heterogeneous nature of the athlete population, with some athletes more at risk than others. Majority of the findings seem to support that athletes in sports which have strong emphasis on leanness or weight are more prone to develop EDs. However, some studies also showed that subgroups of athletes (e.g. long distance runners) in normal build sports reported higher EDs prevalence. Therefore, the direct relationship between a particular sport and eating disorders was yet to be established. A combination of influences of sports subtypes, physiological and psychosocial factors may provide better explanations for the diversity of findings.

Reasons Pertaining to Eating Disorders:

Eating Disorders and Misconceptions

One's subjective perception of his/her own body weight/shape could have a strong impact on the development of EDs. Dummer et al. (1987) found that many adolescent swimmers in their study had misperceptions about their weight. In particular, females were more apt to perceive themselves as overweight and wanted to lose weight primarily to look better. This misconception is similar to patients with eating disorders who also continuously overestimate their relative weight. On the contrary, runners in the study of Siegel et al. (1990) showed a consistent pattern of underestimation of their relative weight, indicating that they have perceived themselves as thinner than they were found to be by simultaneous measurement. This might explain why runners expressed lesser body dissatisfaction, which in turn reduce their risk for EDs than the non-athletes (Siegel et al., 1990; Warren et al., 1990).

Eating Disorders and External Demand for Weight Control

Athletes' evaluation of their own bodies can be complicated by the significant others such as their coaches or peers. Athletes who are under more pressure to maintain an optimal body weight for athletic performance are more susceptible to disordered eating (Dummer et al., 1987; Guthrie, 1991; Rosen et al., 1986; Sundgot-Borgen, 1993). Dummer et al. (1987) reported that one out of 10 swimmers indicated that their coaches told them how much they should weigh. Similarly, Petrie (1993) found that among pathogenic weight-control gymnasts, two-thirds of the gymnasts (N=28) reported being criticized by their coaches for being overweight. In response to the negative comment, 75% of the gymnasts resorted to pathogenic weight-control methods at significant level.

Eating Disorder and Psychopathology

Personality features such as perfectionism, high achievement expectations, struggling for control, sense of identity, and sense of ineffectiveness have also been identified as important sources of psychological conflicts for ED patients as well as athletes. These psychological characteristics possibly predispose athletes in competitive sports for the development of eating disorders (Brownell & Rodin, 1992; Bruch, 1986; Johnson & Connors, 1987). Eating Disorder Inventory (EDI) constructed by Garner (1991) basically covers a number of essential psychological traits typical to ED patients. The inventory comprised of 3 subscales assessing attitudes and behaviors concerning eating, weight and shape (Drive for Thinness, Bulimia, Body Dissatisfaction), and 5 subscales tapping more on the general psychological features clinically relevant to EDs (Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, Maturity Fear).

Eating Disorders and Competition Anxiety

Competition anxiety is composed of three components: cognitive competition anxiety, somatic competition anxiety and self-confidence, and is usually used to measure the state effects of competition anxiety on athletes' subsequent sport performance (Marten, Vealey & Burton, 1990). Krane's (1993) study partially supported the effects of inverted-U (zone of optimal functioning) hypothesis in a group of soccer. It was evident that poorest performances were observed when athletes' cognitive and somatic anxiety were above their zones, whilst performances did not differ when anxiety was within or below cognitive and somatic anxiety zones.

So far only one study investigated the relationship of athletes' competition anxiety and EDs in athletic population (Williamson et al., 1995). Williamson et al. (1995) postulated that eating disorder symptoms in college athletes were significantly influenced by the interaction of social influence for thinness, *athletic performance/competition anxiety* and self-appraisal of athletic achievement and were mediated by overconcern with body size and shape.

Eating Disorders and Gender

In the general population, eating disorders and associated psychological correlates have consistently been reported to be more frequent in women than men across the Western and Chinese populations (APA, 1994; Garner, 1991; Lee, Lee, Leung & Yu, 1997). Likewise, gender difference over various measures of EDs was found in the athlete population in the West (Burckes-Miller & Black, 1988; Rosen et al., 1986; Stoutjesdyk & Jenve,1992). First, higher incidence of clinical EDs in female than male athletes (AN: 4.2% vs. 1.6%; BN: 39.2% vs.

14.3%) were evident (Black & Burckes-Miller, 1988). Second, female athletes reported higher percentage in the use of pathological weight control methods than males, 30% vs. 16% (Rosen, et al., 1986). Third, female athletes also showed elevated scores in psychological measures of EDs such as body dissatisfaction and drive for thinness subscales (Guthrie, 1991).

Specifically, sex difference in the choice of weight control methods among the athletes was found as well (Black & Burkes-Miller, 1988). Higher percentage of male athletes had reported doing excessive exercises for weight loss than female athletes. Conversely, the use of pathological weight control methods such as dieting, fasting ≥ 24 hours, fad diets, self-induced vomiting, and taking laxatives and diuretics had been found significantly more among female than male athletes. Black and Burkes-Miller (1988) concluded that methods used by male athletes tended to be more "active" whereas female athletes' tended to be more "passive".

Eating Disorders in Asian Societies

In Asian societies such as China, Hong Kong, India, Malaysia, Singapore and Taiwan, eating disorders have been reported to be very rare (Burhrich, 1981; Lee, Chiu & Chen, 1989; Khandelwan & Saxena,1990; Ong & Tsoi, 1982; Tseng, Lee & Lee,1989). This rarity is conjectured to be caused by the non-Western acceptance of plumpness as a sign of prestige and beauty that leads to the unpopularity of dieting behavior (Brown & Konner, 1987).

However, recent empirical evidence increasingly show that fatness is no longer valued by young non-western females who have been exposed to Westernization (Ford, Dolan & Evans, 1990; Mumford, Whitehouse & Choudry. 1991). Advertising pressure and the advocacy of 'Western' aesthetic ideals of sliminess to be attractive for females are also becoming more

pervasive. It is suggested that there is a trend of increasing eating disorders in Asian countries (Lee, 1991; Lee, 1995). Eating disorders are no longer pathology bound to the Western populations.

So far, there was only one large scale study that used the Chinese version of EDI, one of the popular measures of EDs in the field, in a non-clinical population in Hong Kong (Lee et al., 1997). Lee et al. also found that both female (mean weight = 50.35 kg, mean height = 1.61 m) and male (61.02 kg, 1.72 m) subjects in their study were judged as slim and short by Western standards. It was suggested that the low BMI for Chinese may be one of the factors that has contributed to the low prevalence rate of actual disordered eating behaviors among Chinese than their Western counterparts (Lee, 1993). However, whether this hypothesis is applicable to the athletic population remained to be examined as athletes are supposed to be bound by a relatively standard set of physique requirement of the type of sport he/she is participating in.

Objectives of The Present Study

The present study is the first attempt to examine the disordered eating behaviors and attitudes among the Chinese athletes in Hong Kong. Firstly, the prevalence of EDs in the athletes of the Oriental world has not been established yet. The aim of this study is to set up the first set of data in the prevalence of EDs and associated psychopatholgy among a varsity of Hong Kong Chinese athletes.

Secondly, other than estimating the prevalence rate of clinical and subclinical EDs, psychological correlates such as drive for thinness, body dissatisfaction, bulimia, ineffectiveness, interoceptive awareness, interpersonal distrust and maturity fears that may modulate the development of eating disturbances will be investigated in this study.

Thirdly, factors residing in the sport environment may have played an important role in predisposing or exacerbating the problems of EDs. Therefore, it is also the aim of this study to investigate factors that may have taken place in complicating the EDs problems for an athlete. First, it is speculated that pressure stemmed from sports, as reflected by one's rank, types of sports he/she was participating in and the level of competition anxiety, may have a close relationship with EDs. Therefore, it is hypothesized that athletes belonging to groups of elite, shape/weight dependent, high competition anxiety will show more psychological and behavioral problems on EDs than groups of non-elite, non-shape/weight dependent and low competition anxiety respectively. Second, athletes were also given the chance to attribute reasons for their decisions for weight control or the development of EDs. To their own conscience, they were to rate items that enlisted factors specific to sports environment that may contribute to their weight control, e.g. "weight loss is required for performance excellence".

Fourthly, most of the research on eating disorders among athletes are conducted in the Western world and a number of instruments with good validity and reliability are developed (e.g. EDI). While using the conventional measures (EDI- Chinese version), this study will also attempt to find out the usefulness of a new instrument developed in Hong Kong, which is Eating Symptom Checklist (Li, 1994). In the present study, this questionnaire was revised as Eating Symptom Checklist-Revised (ESC-R). ESC-R was designed for simulated diagnosis of EDs with criteria that follow the DSM-IV's and was supplemented by information on weight control methods being endorsed by the subjects.

Generically, Chinese's physique and culture are very different from the Westerners'. Obviously, monetary and social rewards for an athletic success are enormous for an athlete in the West. Thus, the competitiveness of sports and athletes' drive for better performance are expected to be

higher for the Western athletes as well. It is logically deducted that Chinese athletes would be less vulnerable for EDs than their Western counterparts then. In addition, comparing the findings of the Chinese athletes and local norm, features that characterize the Chinese athlete populations were further illustrated. Hence, to explain the profile and prevalence of EDs of Chinese athletes, the biological and socio-cultural characteristics of the Hong Kong Chinese would be considered.

Finally, limitations and implications for future research would also be considered.

CHAPTER TWO: METHODS

Subjects

Table 1 shows the composition of the subjects. Of the 242 Chinese athletes, 116 (47.9%) were males and 126 (52.1%) were females. The athletes were subdivided by rank (elite vs. non-elite) and sports type (shape/weight dependent vs. non shape/weight dependent). Among which, 89 (36.8%) were elite and 153 (63.2%) were non-elite. Of the athletes, 104 athletes (43%) belonged to shape/weight dependent and 138 athletes (57%) belonged to non-shape/weight dependent sports type.

Elite athletes were those presently trained to represent Hong Kong in international competitions. Jockey and ballet dancers in the elite group were recognized professionals for major open competitions or performances in local arena. Non-elite athletes were members of the school team in a tertiary institution. Ballet dancers and gymnasts in the non-elite groups were amateurs from a local ballet dancing school and two high schools respectively.

With reference to previous studies, athletes were classified into weight/shape dependent and non-shape/weight dependent sports type, depending on the degree of demand for leanness and weight control (Davis & Cowles, 1989; Stoutjesdyk & Jevne, 1993; Sungot-Borgen, 1993a, 1993b). The present study classified ballet dancing, gymnastics, horse racing, wu shu, windsurfing and trianlon as shape/weight dependent sports type. Trianlon included three sports, long distance running, swimming and cycling. In a conservative manner, Trianlon was classified as shape/weight dependent group as long distance running was generally identified as potentially high risk sport for EDs. Sports like ball games, swimming, cycling, running, track & field were classified as non-shape/weight dependent group.

Table 1. Distribution of Subjects

	Elite			Non-elite		
	M (%)	F (%)	Total (%)	M (%)	F (%)	Total (%)
Shape/weight dependent sports						
1. Ballet Dancing	1	7	8	0	12	12
2. Gymnastics	8	10	18	6	35	41
3. Horse racing	6	2	8	0	0	0
4. Wu Shu	1	1	2	0	0	0
5. Windsurfing	4	2	6	0	0	0
6. Trianlon	7	2	9	0	0	0
Sub-Total	**27 (56.3)**	**24 (58.5)**	**51 (57.3)**	**6 (8.8)**	**47 (55.3)**	**53 (34.6)**
Non shape/weight dependent sports						
1. Badminton	2	2	4	7	1	8
2. Basketball	0	0	0	11	12	23
3. Handball	0	0	0	12	2	14
4. Ping Pong	2	7	9	7	0	7
5. Squash	8	5	13	4	3	7
6. Tennis	3	1	4	9	5	14
8. Cycling	4	0	4	0	0	0
9. Swimming	2	1	3	4	2	6
10. Long/High Jump	0	0	0	1	2	3
11. Throw (e.g. discs)	0	0	0	4	5	9
12. 100 & 200 m Run	0	1	1	0	2	2
13. 600 & 800 m Run	0	0	0	3	4	7
Sub-Total	**21 (43.7)**	**17 (41.5)**	**38 (42.7)**	**62 (91.2)**	**38 (44.7)**	**100 (65.4)**
Total	**48 (100)**	**41 (100)**	**89 (100)**	**68 (100)**	**85 (100)**	**153 (100)**

Note. Trianlon included long distance running, swimming and cycling.

Measures

Basic Information

Questions were set to obtain information about subjects' demographic data, current weight and height, weight cycle, ideal weight and duration in the sport (Appendix A). A Body Mass Index (BMI = weight/height^2) and Ideal Body Mass Index (IBMI) were derived from these information. Appendix F presents the English version of the whole questionnaire.

Competitive Sports Anxiety Inventory- 2 (CSAI-2).

CSAI-2 measures existing states of cognitive anxiety, somatic anxiety and self-confidence in competitive situations (Marten et al., 1990). Items are rated on a 4-point Likert-type scale from "not at all" to "very much so". Internal consistency, with reliability coefficients for each subscale ranged from .80 to .90 (Martens et al., 1990). In the present study, the questionnaire was used to measure the anxiety participants generally experienced before competition rather than being used as a state measure. Besides, only the cognitive and somatic competition anxiety subscales were used. The scores of the these two subscales were combined to give a total competition anxiety score (Appendix B).

Some studies argue that it is not the sensation of anxiety level that affected athletes' performance but their interpretation of experienced anxiety (Jones, Hanton & Swain, 1994; Jones & Swain, 1995). Therefore, a directional scale was included in the present study as well. Subjects were asked to rate the extent of the experienced intensity of each symptom as facilitative (from +1 to +3) or deliberative (from -1 to -3) to subsequent performances. However, it was found that the directional scale in the present study provided no additional information and was relatively confusing to the subjects. Thus, it was dropped from the subsequent analysis.

The internal consistency of the Chinese version of CSAI-2 in this study as indicated by the Cronbach's alphas of subscales Cognitive Competition Anxiety, COG-A (alpha = .87) and Somatic Competition Anxiety, SOM- A (alpha = .79) were satisfactory. Cronbach alphas of both male (COG-A = .88; SOM- A = .80) and female subjects (COG-A = .86; SOM-A = .77) were satisfactory as well. These figures were similar to that of Martens et al. (1990).

Eating Disorder Inventory (Garner, 1991).

The EDI (Appendix C) measures a number of psychological features as well as attitudes and behaviors pertaining to EDs (Garner & Olmsted, 1984; Garner, 1991). The 8 subscales of the EDI are:

Drive for Thinness	Excessive concern with dieting, preoccupation with weight, and fear of weight gain
Bulimia	The tendencies to obsess about and engage in bouts of uncontrollable overeating (bingeing).
Body Dissatisfaction	Dissatisfaction with the overall shape and size of some body parts deemed important for those with eating disorders.
Ineffectiveness	Feelings of general inadequacy, worthlessness, emptiness, and lack of control over one's life.
Perfectionism	The extend of one's belief that personal achievement should be superior.
Interpersonal Distrust	An individual's feelings of alienation and unwillingness to form close relationships. The need to keep others at a distance has been described as an significant psychological theme in the development and maintenance of some ED cases.
Interoceptive Awareness	Confusion and apprehension in recognizing and appropriately responding to the emotional states of individuals.
Maturity Fears	This subscale assesses the desire to retreat to the security of preadolescent. Fears of psychological and biological experiences associated with adulthood and the wish to get back to previous lower body weight and youth feelings have been suggested as the themes in the psychopathology of EDs.

The items are constructed on a 6-point rating scales: never, rarely, sometimes, often, usually and always. When scoring each item, the three points in the "non-anorexic" range are

collapsed to give a score of 0 and three other points in the anorexic range are assigned the values of 1, 2 and 3 respectively.

The EDI was used in this study because: (1) it covers the essential psychological features identified among ED patients in the West (Casper et al., 1992; Garner, 1991; Pate et al. 1992); and (2) a number of validation studies have proved the reliability and construct validity of the subscales of EDI (Garner, 1991; Garner, Olmested & Polivy, 1983; Garner & Olmsted, 1984; Raciti & Norcross, 1987; Welch, Hall & Norring, 1990; Selch, Hall & Walkey, 1988). In an ED sample, Garner & Olmsted (1984) reported satisfactorily high internal consistency with Cronback alpha of over .80 for all the subscales. The internal consistency of Chinese version of EDI was generally satisfactory as well, ranged from .62 to .89 (Li, 1994; Lee, Lee, Leung and Yu, 1997). Using factor analysis, constructs found among the Chinese adolescent girls are similar to the original English version of EDI used in the West (Li, 1994).

In this study, the Chinese EDI also demonstrated a satisfactory internal consistency. The Cronbach's alphas of 8 individual subscales including Drive for Thinness (alpha = .81), Bulimia (alpha = .70), Body Satisfaction (alpha = .85), Ineffectiveness (alpha = .81), Perfectionism (alpha = .70), Interpersonal Distrust (alpha = .68), Interoceptive Awareness (alpha = .77) and Maturity Fears (alpha = .64) were generally satisfactory. Cronbach alphas of male athletes ranged from .53 to .79 and female's ranged from .69 to .87. These alpha values were generally comparable to other local and Western studies (Garner, 1991; Lee et al., 1997).

Eating Symptoms Checklist- Revised (ESC-R)

The ESC (Eating Symptoms Checklist), a newly constructed instrument, is a collection of the operationalized criteria in the DSM-IV (APA, 1994) for diagnosing Anorexia Nervosa, Bulimia Nervosa, and Binge Eating Disorder (BED) (Li, 1994). The ESC was revised as Eating

Symptoms Checklist- Revised (ESC-R) in the present study with the reported symptoms have to be within the past nine months (Appendix D).

Of the 19 items in the ESC-R, 3 items inquires about *binge eating* and the associated characteristics. The first one asks if the subject ate large quantity of food, as judged by most people, in a short period of time (within 2 hours). The second one asks if the eating episode was uncontrollable. Subjects were asked to rate the two items on a 6-point Likert point scale ranging from "never" (1) to "almost daily"(6). The third question inquires about the eating pattern and the emotional consequences after binge eating: (i) eating much more rapid than usual; (ii) eating until you felt uncomfortably full; (iii) eating large amount of food when you didn't feel physically hungry; (iv) eating alone because you were embarrassed by how you were eating; (v) feeling disgusted with yourself, depressed, or feeling very guilty after the overeating (4-point Likert scale from "very true' to "very untrue").

There are 2 items on *attitudes towards body weight and shape* including the degree of concern compared to other aspects of lives (5 point Likert scale from "without any effects" to "very much affected") and how the subject was bothered by the body shape/weight problem (4-point Likert scale from "very untrue" to "very true").

Seven items are used to measure *weight control behaviors* including eating of low fat food, use of diet drugs (e.g. pills/tea), dieting, 24 hours fasting, excessive physical exercise (> 1 hour) , use of laxatives or diuretics and self-induced vomiting. Subjects were requested to check the frequencies at which they engage in these behaviors (6 levels from "never" to "almost daily").

Three items that inquires about *anorexia nervosa* are: "Even though a lot of people commented that I was underweight, I still wished to lose weight", " Although my weight was 10

pounds below normal, I didn't not think that I have weight problem" and " Although my weight was 10 pounds below normal, I was afraid of weight gain". These items are rated by 4-point Likert scale from "very true" to "very untrue".

Finally, there are two items concerning with *menstruation*. One on the accuracy of menstrual cycles (4-point Likert scale from "very inaccurate" to "very accurate") and the other on the time when the last menstruation occurred (6 levels from "within one month" to "never have menstruation"). Two items asks about maximum gain and loss in weight within a month (5 levels from "less than 4 lb." to "more than 20 lb.").

Simulated Diagnoses

Simulated diagnoses of clinical and subclinical AN, BN and BED are based primarily on the information solicited in the ESC-R. Subjects were also classified into different eating behavior categories to give a more complete magnitude of eating pathologies. The classification criteria are listed in Table 2.

Survey for Contributing Factors of Athletes' Weight Control.

Ten questions adapted from Survey of Eating Disorders Among Athletes (Guthrie, 1991) were used to investigate contributing factors in sports environment in athletes' engagement of weight control methods (Appendix E). Subjects were asked to rate in a Likert scale ranged from 0 = "no relationship at all" to 5 = "very much related".

Table 2. Criteria for Eating Behavior Categories

Eating Behavior Categories	Criteria Subjects endorse questionnaire items indicating
Anorexia Nervosa (AN)	(1) weight 15% below expected weight; (2) intense fear of gaining weight or becoming fat; (3) denial of seriousness of current low body weight or undue influence of body shape and weight on self-evaluation; and (4) absence of at least three consecutive menstrual cycles when otherwise expected to occur (DSM-IV)
Bulimia Nervosa (BN)	(1) binge eating at a frequency of more than twice a week; (2) regularly (more than once a week) engage in self-induced vomiting, or laxatives or diuretics use, or dieting or fasting, or exercise to prevent weight gain; and (3) undue influence of body shape and weight on self-evaluation (DSM-IV)
Binge Eating Disorder (BED)	(1) binge eating at a frequency of more than twice a week; (2) loss of control associated with binge eating; and (3) marked distress regarding binge eating or (4) the struggle against binge eating (DSM- IV)
Subclinical AN	Criteria for AN above: (1); (2) or (3); and (4) or absence of at least one menstrual cycle when otherwise expected to occur
Subclinical BN	binge eating at a frequency of more than once a week; and (2) for BN above
Subclinical BED	binge eating at a frequency of more than once a week; and (3) or (4) for BED above
Normal Eater	without engaging in binge eating and any one form of weight control methods except eating low fat food

Note: Subjects meeting criteria for a category were excluded from inclusion in subsequent categories according to the order listed in the table. Refer to Appendix G for detailed classification criteria.

Procedure

Questionnaires were distributed by the coaches of respective teams during their practice time. Participants could return their questionnaires by post or through their coaches in a sealed envelope prescribed by the examiners. On average, it took the subjects about 40 minutes to complete the battery.

CHAPTER THREE: RESULTS

Prevalence of Clinical and Subclinical EDs

According to the criteria described earlier (Table 2), the subjects were classified into different eating behavior categories. At *clinical level*, none of the subjects met the criteria for Anorexia Nervosa (AN) and Binge Eating Disorder (BED), with only 1 met the criteria for Bulimia Nervosa (BN) (total = .4 %, male = .9%, female = 0%). *Subclinically*, no subjects met the criteria of subclinical AN but 16 subjects were found to be subclinical BN (total = 6.8%, male = 4.5%, female = 8.9%) and 3 as subclinical BED (total 1.3%, male = .9%, female = 1.6%). Slightly above half of the subjects (total = 62%, male = 67.3%, female = 57.3%) were classified as Normal Eaters who are totally abstained from any kind of weight control methods. Eight subjects were not included in the classification because of insufficient information for classification.

As a whole, 10.2% of the athletes reported clinical level (twice per week or above), and 30.2% reported subclinical level (once per week or below) of binge eating. Taken together, 40.4% (N = 95) of the athletes reported binge eating. Nevertheless, among the binge eaters, only 19.8% (male = 22.9%, female = 16.7%) of them reported feeling of socially embarrassed and 25.3% (male = 23.5%, female = 27.1%) of them reported feeling of regret or distressed after overeating. As for weight control methods, the most commonly used methods were eating low fat food (total = 41.6%), exercising (total = 41.6%) and dieting (total = 37.1%). For more extreme weight control methods such as taking diet drugs (pills/tea, total = 9.2%) or laxatives/diuretics (total = 6.3%), fasting (total = 6.3%) and self-induced vomiting (total = 5.5%), the prevalent rates were much lower.

Lee (1993) surveyed 1020 (female = 646, male = 374) Chinese university students. Those with scores larger than or equal to 30 in the Eating Attitude Test (EAT-40) (n = 14) were screened out for a telephone interview. Subjects in the present study was younger than Lee (1993)'s (male: 19.94, $t = -3.1, p < .01$; female: 19.79, $t = -5.79, p < .001$). Although there was age difference, subjects of both studies can be taken as generally comparable as they both fell within the high risk age range for EDs, young adolescence and early adulthood (Hsu, 1990; Thelen, Mann, Pruitt & Smith, 1987). Specifically, the binge eating is most typical in late adolescence or in the early 20s (APA, 1994).

Compared to the college female students of Lee (1993)'s study, the prevalence of partial syndrome of bulimia nervosa was higher for the female athletes (.46% vs. 8.9%). Moreover, prevalence of clinical (0% vs. .4%) and subclinical (0% vs. 4.5%) BN for male athletes of the present study were much higher than their college male students as well. Seemingly, the prevalence of EDs was much higher for the athletes than college students in both clinical and subclinical measures.

Subgroup Differences

Athletes were subdivided by gender (male vs. female), rank (elite vs. non-elite), sports type (shape/weight dependent vs. non-shape/weight dependent) and competition anxiety (high vs. low). Pairs in each subgroup were compared with each other over the psychological (EDI) and behavioral measures of EDs (ESC-R). Multivariate analysis of variance (MANOVA) and Chi-square were the statistical models used to compare the pairs' differences over the measures of EDI and ESC-R respectively. Besides, descriptive data such age, BMI and IBMI would also be compared for the pairs as well.

Gender Difference:

Previous studies invariably illustrate that females are more susceptible for EDs in both Western and Chinese populations and among Western athletes. Gender difference in the Chinese athletes was expected to be the same as the Western world. Gender comparisons on demographic/weight measures, psychological and behavioral measures of EDs were completed. The adoption of pathological weight control methods by the samples in the present study would also be contrasted in against with the Western studies' as well.

Demographic and Weight measures

Table 3 presents the distribution of subjects' age, body mass index (BMI), ideal body mass index (IBMI) and duration in the sports (years). There were significant sex differences in age (male = 18.9 yr., female = 17.6 yr., $t = 2.66, p < .01$), BMI (male = 20.9 kg/m^2, female = 19.0 kg/m^2, $t = 5.9, p < .001$) and IBMI (male = 21 kg/m^2, female = 18.2 kg/m^2, $t = 10.7, p < .001$). In average, athletes of both sexes underwent about 5 to 6 years' training in which significant sex difference was not found. A considerable number of female (56.5%) than male (46%) athletes were dissatisfied of their present body weight. Female athletes wished for an ideal BMI which was significantly lower than their current BMI, $t\ (117) = 7.7, p < .000$. For males, the opposite was observed although significant difference was not found, $t\ (105) = -1.01, p > .05$. In other words, male athletes desired to gain weight whereas female athletes wished to lose weight, suggesting that male and female athletes' definition of "ideal" weight could be quite different.

Psychological Measures

Multivariate analysis of variance (MANOVA) was used to examine the sex differences over the psychological measures of EDI and CSAI-2 respectively. Table 3 summarizes the means, standard deviations, and *F*-statistics for the univariate comparisons of the EDI and

CSAI-2. Significant sex difference was found in EDI, *Wilks's* $\lambda = .86$ [$F(1,202) = 4.06, p <.$ 001], in which the significance was mainly contributed by higher Drive for Thinness, Body Dissatisfaction and Maturity Fears of the female athletes. Effect of age over the measures of EDI was controlled.

Sex difference over the measures of CSAI-2 was not found {Wilks's $\lambda = .98$ [$F(1, 226) = 2.63, p > .05)$] } suggesting that male and female athletes experienced similar level of anxiety before competition. This findings was different from the Western studies (Krane & William, 1994; Martens et al., 1990) in which male athletes displayed lower somatic competition anxiety but higher self-confidence (not measured in the current study) than female athletes.

Behavioral Measures

Table 4 shows the frequencies of various disordered eating behaviors measured by ESC-R. Female and male athletes were significantly different in prevalence of binge eating and less pathological weight control methods. Significantly higher percentage of female than male athletes reported binge eating (49.4 vs. 31.5%, $\chi^2 = 7.2$, $p < .05$), exercising excessively (49.2% vs. 33.1%, $\chi^2 = 6.85$, $p < .05$) and eating low fat food (31.3% vs. 50.8%, $\chi^2 = 9.36$, $p < .001$). In addition, 15% and 12.9% of female and male athletes reported the use of at least one pathological weight control methods respectively. Compared to athletes of Western studies including mixed types of sports (female = 30-41% & male = 16%), the prevalence were lower for the Chinese athletes, especially for females (Black & Burckes, 1988; Overdorf, 1994; Rosen et al., 1986).

As noted from the demographic measures, female athletes were younger at age than the male. However, the effect of age was controlled in the analysis of EDI. In short, female athletes

scored significantly higher on some psychological measures of EDI, including Drive for Thinness, Body Dissatisfaction and Maturity Fears than their male counterparts. Besides, higher proportions of female than male athletes exhibited disordered eating behaviors including binge eating, exercising excessively and eating low fat food.

Table 3. Sample Characteristics

	Males (N = 115)		Females (N = 126)			
	M	*SD*	*M*	*SD*	*t-value*	*p- value*
Age	18.9	3.5	17.6	4.2	2.66	**
BMI (kg/m^2)	20.9	2.6	19.0	2.3	5.90	***
IBMI (kg/m^2)	21.0	2.3	18.2	1.8	10.72	***
Training duration (yrs.)	6	3.6	5.7	3.8	1.55	n.s.
EDI Subscales					Univariate *F* ratio	*p*-value
Drive for Thinness	1.7	3.1	3.8	4.4	17.50	***
Bulimia	1.1	2.4	1.2	1.9	.17	n.s.
Body Dissatisfaction	8.0	5.2	11.6	6.7	18.51	***
Ineffectiveness	3.9	4.1	4.7	4.8	2.90	n.s
Perfectionism	5.4	3.8	4.8	3.9	1.02	n.s.
Interpersonal Distrust	3.5	2.9	3.9	3.8	1.12	n.s.
Interoceptive Awareness	2.8	3.8	3.3	4.3	.37	n.s.
Maturity Fears	7.8	3.7	9.4	4.6	7.01	**
CSAI-2						
Cognitive Competition Anxiety	21.4	5.9	22.8	5.2	4.32	n.s.
Somatic Competition Anxiety	18.3	4.5	19.5	4.3	4.61	n.s.

* $p < .05$
** $p < .01$
*** $p < .001$
n.s. = non-significant

Table 4. Endorsement Frequencies and Percentages of Disordered Eating Behaviors by Sex

	Male (N = 116)	Female (N = 126)	Total (N = 242)	Pearson χ^2 (sex by level)
BINGE EATING #				
Never	76 (68.5)	64 (51.6)	140 (59.6)	
Subclinical level	25 (22.5)	46 (37.1)	71 (30.2)	
Clinical level	10 (9.0)	14 (11.3)	24 (10.2)	7.20 *
SELF-INDUCED VOMITING				
Never	106 (94.6)	119 (94.4)	225 (94.5)	
Subclinical level	4 (3.6)	6 (4.8)	10 (4.2)	
Clinical level	2 (1.8)	1 (.8)	3 (1.3)	.66 n.s.
TAKING LAXATIVES OR DIURETICS				
Never	103 (92.8)	119 (94.6)	222 (93.7)	
Subclinical level	6 (5.4)	5 (4.0)	11 (4.6)	
Clinical level	2 (1.8)	2 (1.6)	4 (1.7)	.30 n.s.
TAKING DIET DRUGS				
Never	105 (93.8)	111 (88.1)	216 (90.8)	
Subclinical level	4 (3.6)	7 (5.6)	11 (4.6)	
Clinical level	3 (2.47)	8 (6.3)	11 (4.6)	2.44 n.s.
FASTING				
Never	104 (92.9)	121 (96)	225 (94.5)	
Subclinical level	6 (5.4)	5 (4.0)	11 (4.6)	
Clinical level	2 (1.8)	0	2 (.9)	2.6 n.s.
DIETING				
Never	77 (68.8)	72 (57.6)	149 (62.9)	
Subclinical level	26 (23.2)	32 (25.6)	58 (24.3)	
Clinical level	9 (8.0)	21 (16.8)	30 (12.8)	4.89 n.s.
EXERCISING				
Never	75 (67)	64 (50.8)	139 (58.4)	
Subclinical level	20 (17.9)	38 (30.2)	58 (24.3)	
Clinical level	17 (15.2)	24 (19)	41 (17.3)	6.85 *
EATING LOW FAT FOOD				
Never	77 (68.8)	62 (49.2)	139 (58.4)	
Subclinical level	21 (18.8)	37 (29.4)	58 (24.3)	
Clinical level	14 (12.5)	27 (21.4)	41 (17.3)	9.36**

Figures in bracket were percentages in which athletes who do not respond were not included

Binge eating was qualified when the eating was (a) in large quantity within 2 hours and (b) uncontrollable. The use any compensatory weight loss methods after the binge was optional.

Subclinical is defined by frequency of once or less than once per week; Clinical level is defined by frequency of more than twice per week

* $p < .05$

** $P < .01$

n.s. = non-significant

Rank Difference:

Athletes who compete at elite rank are likely to bear more pressure for better athletic performance than at the non-elite rank. As a result, they may resort to more extreme methods for maximization of their performance. Hence, it was hypothesized that elite athletes were more prone to EDs than non-elite. To verify the validity of this speculation, rank comparisons over the weight, psychological and behavioral measures of EDs were done.

Weight measures

Table 5 presents the means and standard deviations of weight measures of the elite and non-elite athletes for each gender. There was significant sex by rank interaction effect {*Wilks's* λ = .93 [F (1,220) = 7.65, p <. 001] } and main effects for sex {*Wilks's* λ = .64 [F (1,219) = 60.5, p <. 001] } and rank {*Wilks's* λ = .91 [F (1,219) = 11.1, p <. 001] } over the weight measures. For rank main effects, non-elite athletes weigh significantly heavier than elite athletes, which probably was a result of less intensive training for the former. In line with this supposition, the interaction of BMI and sex indicated that male non-elite athletes were "exceptionally" heavy (21.8 kg/m^2) when compared with elite males (19.6 kg/m^2), elite (19.2 kg/m^2) and non-elite (19.0 kg/m^2) females who were sharing similar BMI.

Psychological Measures

Over the measures of EDI (Table 5), there was no interaction effect whereas main effects on sex {*Wilks's* λ = .86 [F (1,95) = 3.94, p <. 000] } and rank {*Wilks's* λ = .91 [F (1,200) = 2.33, p <. 021] } were found. Significance of rank main effect was mainly contributed by elite athletes' higher scores on two EDI subscales, Ineffectiveness and Interpersonal Distrust.

Table 5. EDI Profile of Elite and Non-Elite Athletes for Both Sexes

	Male				Female				
	Elite (N =47)		Non-elite (N =68)		Elite (N = 41)		Non-elite (N = 85)		Effects
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	
BMI (kg/m^2)	19.6	2.5	21.8	2.3	19.2	2.3	19.0	2.3	a, b, c
IBMI (kg/m^2)	19.8	2.2	21.9	1.9	18.0	2.1	18.3	1.6	a, b, c
Drive for Thinness	1.4	2.5	1.8	3.4	4.0	4.9	3.9	4.2	a
Bulimia	1.0	2.5	1.2	2.4	0.8	1.4	1.3	2.1	n.s
Body Dissatisfaction	8.5	5.2	7.7	5.2	12.2	6.4	11.4	6.9	a
Ineffectiveness	5.7	4.9	2.5	2.8	5.4	5.3	4.4	4.6	b
Perfectionism	5.1	3.5	5.5	4.0	4.4	2.9	5.0	4.3	n.s.
Interpersonal Distrust	4.4	3.1	2.9	2.6	4.3	3.9	3.8	4.8	a,b
Interoceptive Awareness	2.9	4.4	2.7	3.4	3.1	4.8	3.4	4.0	n.s.
Maturity Fears	8.9	4.4	7.0	3.0	9.8	4.5	9.2	4.7	n.s.

"a, b, c" represent sex main effect, rank main effect and sex by rank interaction effect at significance $p < .05$.
n.s. = non-significant

Behavioral Measures

Table 6 presents binge eating and weight control methods (once per week or above) endorsed by *elite and non-elite* groups of athletes under each sex category. Using chi-square test, significant difference between female elite and non-elite athletes over the use of diet drugs (e.g. diet pills) was found ($\chi^2 = 5.1, p < .05$). Although statistically non-significant, greater percentage of elite than non-elite athletes engaged in other measures of disordered eating were also noted. For instance, the prevalence of binge eating (male: 15.2% vs. 10.8%; female: 27.5% vs. 17.9%), exercising (male: 27.1% vs. 20.6%; female: 31.7% vs. 21.2%) and eating low fat food (female: 43.9% vs. 29.4%) tended to be higher for the elite than the non-elite athletes.

Table 6. Endorsement Percentage of Disordered Eating Behaviors by Rank (once per week or above)

	Male		χ^2	Female		χ^2
	Elite (N = 48)	Non-elite (N = 68)		Elite (N =41)	Non-elite (N =85)	
BINGE EATING #	15.2	10.8	.48 n.s.	27.5	17.9	1.5 n.s.
SELF-INDUCED VOMITING	2.1	3.1	.11 n.s.	2.4	2.4.	.00 n.s.
TAKING LAXATIVES OR DIURETICS	4.2	1.6	.69 n.s.	7.3	0	6.4 n.s.
TAKING DIET DRUGS	6.3	3.1	.63 n.s.	14.6	3.5	5.1 *
FASTING	2.1	4.7	.54 n.s.	0	2.4.	.98 n.s.
DIETING	10.4	10.9	.01 n.s.	25	25.5	.32 n.s.
EXERCISING	27.1	20.3	.71 n.s.	31.7	21.2	1.65 n.s.
EATING LOW FAT FOOD	18.8	17.2	.46 n.s.	43.9	29.4	2.58 n.s.

Binge eating was qualified when the eating was (a) in large quantity within 2 hours and (b) uncontrollable. The use of any compensatory weight loss methods after the binge was optional.

* $p < .05$

n.s. = non-significant

In sum, elite athletes scored significantly higher on some psychological measures of EDI (Ineffectiveness and Interoceptive Awareness) than their non-elite counterparts. Higher

proportions of female elite than non-elite athletes reported using drugs for weight control. Besides, there was non-significant tendencies for higher percentage of elite than non-elite athletes in engaging various weight control measures.

Sports Types Difference:

Western researches generally illustrate that athletes belonging to shape/weight dependent sports type generally are at higher risk for EDs than the non-shape/weight dependent. Thus, it was hypothesized that Chinese athletes belonging to shape/weight dependent group would show more disordered eating psychopathology. Besides, it was expected that higher percentage of them than non-shape/weight dependent athletes reported engaging in pathologically weight control methods.

Weight measures

Table 7 presents the means and standard deviations of measures of weight and EDI. There was no significant sex by rank interaction effect {*Wilks's* $\lambda = .99$ [$F(1,220) = .57, p > .56$] } but there were main effects for sex {*Wilks's* $\lambda = .68$ [$F(1,219) = 51.4, p < .001$] } and sports type {*Wilks's* $\lambda = .86$ [$F(1,219) = 17.7, p < .001$] } over the weight measures. Athletes in the shape/weight dependent sports generally shared lower BMI and IBMI than the non-shape/weight dependent sports. The difference in weight measures for athletes in the two types of sports might reflect the different set of physical requirement.

Table 7 EDI Profile of Shape/Weight Dependent and Non Shape/Weight Dependent Athletes for Both Sexes

	Male				Female				Effects
	Shape/Weigh Dependent (N = 32)		Non Shape/Weight Dependent (N = 83)		Shape/Weight Dependent (N = 71)		Non Shape/Weight Dependent (N = 55)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	
BMI (kg/m^2)	19.9	2.6	21.3	2.52	18.2	2.4	20.1	1.5	a, b
IBMI (kg/m^2)	20.1	2.2	22.4	2.2	17.3	1.7	19.2	1.2	a, b
Drive for Thinness	1.4	2.4	1.8	3.3	3.9	4.6	3.7	4.1	a
Bulimia	.7	1.5	1.2	2.7	.9	1.8	1.5	2.0	b
Body Dissatisfaction	7.3	4.4	8.3	5.4	11.8	6.6	11.5	7.0	a
Ineffectiveness	4.3	3.7	3.7	4.2	5.5	5.0	3.8	4.5	n.s.
Perfectionism	5.1	3.8	5.5	3.8	4.9	4.0	4.8	3.8	n.s.
Interpersonal Distrust	3.4	3.0	3.5	2.9	4.0	3.7	3.8	3.9	a
Interoceptive Awareness	1.9	2.8	3.1	4.2	3.2	4.2	3.3	4.4	n.s.
Maturity Fears	8.1	3.9	7.7	3.6	9.6	4.7	9.0	4.5	n.s.

"a, b, c " represent sex main effect, sports type main effect and sex by sports type interaction effect at significance $p < .05$
n.s. = non-significant

The classification of sports types (shape/weight dependent and non-shape/weight dependent) in the present study resembled to that of Davis and Cowles (1989) in which female athletes were classified as thin-built (N = 64, mean age = 19.3) and normal built (N = 62, mean age = 21.7). Compared to the thin-built athletes (mean = 19.95 kg/m^2, S.D = 1.89) of Davis and Cowles (1989), the BMI of the Chinese female athletes in the shape/weight dependent sports type was lower ($t = 8.47, p < .001$). Similarly, the Chinese female athletes in non-shape/weight dependent sports type also has a lower BMI ($t = 10.47, p < .001$) than the normal-built Western female athletes (mean = 21.87 kg/m^2, S.D. = 1.53). This finding suggested that the Chinese athletes shared a lower BMI than their Western counterparts despite similar physique requirement generally denoted in each sports type.

Psychological Measures

Over the measures of EDI (Table 7), there was no interaction effect whereas main effects on sex {*Wilks's* $\lambda = .88$ [$F(1,200) = 3.23, p <. 01$] } and sports type {*Wilks's* $\lambda = .92$ [$F(1,95) = 2.07, p < .05$] } were found. Significance of sports type main effect was contributed by higher score of the non shape/weight dependent sports type on one EDI subscale, Bulimia. It is probable that athletes in the non shape/weight sports could "afford" to have more uncontrollable binge eating as the pressure for a lean body or low body weight may be lower for them.

Behavioral Measures

Table 8 presents binge eating and weight control methods (once per week or above) endorsed by *shape/weight dependent and non shape/weight dependent* sports type of athletes under each sex category. It was found that more female athletes in the non shape/weight

dependent sports reported binge eating behaviors (29.6% vs. 14.3%, $\chi^2 = 6.85$, $p < .05$) than the shape/weight dependent sports.

In short, athletes in non-shape/weight dependent sports group showed higher Bulimia (EDI subscale). Consistently, binge eating was observed to be higher in female athletes in shape/weight dependent than non-shape/weight dependent sports. The hypothesis that shape/weight dependent athletes would show more ED problems than non-shape/weight dependent was not supported.

Table 8. Endorsement Percentage of Disordered Eating Behaviors by Sports Type (once per week or above)

	Male			Female		
	Shape/ Weight Dependent (N = 33)	Non Shape/ Weight Dependent (N = 83)	χ^2	Shape/ Weight Dependent (N =71)	Non Shape/ Weight Dependent (N = 55)	χ^2
BINGE EATING #	12.9	12.5	.00 n.s.	14.3	29.6	4.33 *
SELF-INDUCED VOMITING	3.0	2.5	.02 n.s.	1.4	3.6	.66 n.s
TAKING LAXATIVES OR DIURETICS	6.1	1.3	2.0 n.s.	2.8	1.8	.13 n.s.
TAKING DIET DRUGS	6.1	3.8	.28 n.s.	7.0	7.3	.00 n.s.
FASTING	3.0	3.8	.04 n.s.	0	3.6	2.6 n.s.
DIETING	12.1	10.1	.97 n.s.	24.3	23.6	.00 n.s.
EXERCISING	15.4	10.3	.50 n.s.	23.9	25.5	.04 n.s.
EATING LOW FAT FOOD	15.2	19.0	.23 n.s.	31.0	38.2	.71 n.s.

Binge eating was qualified when the eating was (a) in large quantity as judged by most people within 2 hours (b) uncontrollable. The use of any compensatory weight loss methods after the binge was optional.
* $p < .05$
n.s. = non-significant

Competition Anxiety Level:

Cognitive and somatic competition anxiety as measured by CSA-2 were combined to form a composite score of competition anxiety. Athletes with competition scores above the 70th percentile were classified into the high competition anxiety group (N = 71) whereas those below were classified into the low competition anxiety group (N = 156). In order to obtain groups of sufficiently large sample size for comparisons and without offsetting the purpose of screening anxious athletes, the 70th percentile cutoff was chosen.

Weight Measures

Table 9 presents the means and standard deviations of the weight and EDI measures of high and low anxiety groups of athletes. There was significant main effect for sex {*Wilks's* $\lambda = .71$ [$F(1,210) = 42.3, p < .001$] } but there were no interaction effect (sex by rank) and main effect for competition. Non-significant difference between the high and low competition anxiety groups in BMI and IBMI suggested that these two groups were rather comparable in terms of weight measures.

Psychological Measures

Over the measures of EDI (Table 9), there was no interaction effect, whereas main effects on sex {*Wilks's* $\lambda = .86$ [$F(1,191) = 3.65, p < .001$] } and competition anxiety {*Wilks's* $\lambda = .82$ [$F(1,191) = 5.00, p < .001$] } were found. Significance of competition anxiety main effect was contributed by higher scores of the high competition anxiety group on *all* of the EDI subscales except Interoceptive Awareness.

Behavioral Measures

Table 10 presents binge eating and weight control methods (once per week or above) endorsed by *high competition anxiety and low competition anxiety* groups of athletes under each sex category. For females, higher percentage of athletes in the high than low competition anxiety group reported excessive exercising (37.8% vs. 18.7%, $\chi^2 = 5.36$, $p <. 05$). For males, higher percentage of athletes in the high than low competition anxiety group reported binge eating (33.3% vs. 7.6%, $\chi^2 = 10.4$, $p < .01$).

In a like manner, small sample size of the high competition anxiety group makes statistical analysis impossible in most of the measures of weight control. Nevertheless, some of the non-significant differences were also noteworthy. First, similar to the distribution of excessive exercises in females, greater number of male athletes of the high than the low competition anxiety group reported excessive exercising (38.5% vs. 20.5%). Second, much larger percentage of high than low competition anxiety group reported binge eating (male: 33.3% vs. 7.6%; female: 27.9% vs. 17.3%), dieting (male: 15.4% vs. 10.3%; female: 34.1% vs. 20.0%) and low fat food (male: 30.8% vs. 15.4%; female: 40.0% vs. 33.3%) for both sexes.

To conclude, athletes with high competition anxiety showed elevated scores on all subscales of EDI except Interoceptive Awareness. Higher percentage of binge eating (male) and exercising excessively (female) were observed for athletes with higher competition anxiety. There was also non-significant tendency for greater number of high competition anxious athletes to engage in other forms of weight control as well.

Table 9. EDI Profile of High and Low Competition Anxiety Athletes for Both Sexes

	Male				Female				Effects
	High Competition Anxiety (N = 26)		Low Competition Anxiety (N = 81)		High Competition Anxiety (N = 45)		Low Competition Anxiety (N = 75)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	
BMI	20.8	2.9	21.0	2.5	19.3	2.3	19.0	2.3	a
IBMI	20.6	2.1	21.2	2.3	18.4	1.5	18.0	2.0	a
Drive for Thinness	3.0	4.1	1.4	2.8	5.9	5.2	2.7	3.3	a, b
Bulimia	2.5	3.3	.7	1.9	1.7	2.5	.89	1.5	b
Body Dissatisfaction	10.1	5.2	7.4	5.2	13.7	7.2	10.7	6.2	a, b
Ineffectiveness	6.4	5.8	3.0	3.0	6.5	6.3	3.7	3.2	b
Perfectionism	6.4	3.4	5.1	3.9	6.0	4.0	4.1	3.7	b
Interpersonal Distrust	3.6	3.0	3.4	3.0	5.1	4.5	3.3	3.3	a, b
Interoceptive Awareness	6.0	5.7	1.9	2.5	4.9	4.8	2.3	3.7	n.s.
Maturity Fears	9.5	3.3	7.3	3.8	10.3	4.9	8.8	4.1	b

"a, b, c" represent sex main effect, competition anxiety main effect and sex by competition anxiety interaction effect at significance $p < .05$
n.s = non-significant

Table 10. Endorsement Percentage of Disordered Eating Behaviors by Competition Anxiety Level (once per week or above)

	Male			Female		
	High Anxiety (N = 26)	Low Anxiety (N = 81)	χ^2	High Anxiety (N = 45)	Low Anxiety (N =75)	χ^2
BINGE EATING #	33.3	7.6	10.4 **	27.9	17.3	1.83 n.s.
SELF-INDUCED VOMITING	3.8	1.3	.68 n.s.	0	4	1.84 n.s.
TAKING LAXATIVES OR DIURETICS	0	2.6	.69 n.s.	4.4	1.3	1.1 n.s.
TAKING DIET DRUGS	7.7	2.6	1.39 n.s.	11.1	5.3	1.35 n.s.
FASTING	3.8	3.8	.00 n.s.	2.2	1.3	.14 n.s.
DIETING	15.4	10.3	.50 n.s,	34.1	20.0	2.92 n.s.
EXERCISING	38.5	20.5	3.35 n.s.	37.8	18.7	5.36 *
EATING LOW FAT FOOD	30.8	15.4	2.97 n.s.	40.0	33.3	.54 n.s.

Binge eating was qualified when the eating was (a) in large quantity as judged by most people within 2 hours and (b) uncontrollable. The use of any compensatory weight loss methods after the binge was optional.

* < .05

** < .01

n.s. = non-significant

Comparisons with Local and Western Studies

Local Study

Using the Chinese Eating Disorders Inventory, Lee et al. (1997) recently surveyed a large sample of Chinese college students (males 566, females 606). Table 11 presents the findings of the present study and that of Lee et al. (1997) as their study was employed as a norm for comparison of Chinese athletes and college students over the measures of EDI.

The athletes were slightly younger (2-3 yrs.) than the college students (male: $t = -3.83, p < 0.01$; female: $t = -6.49, p < 0.001$) and female athletes' mean BMI was slightly lower than the female college students (.5 kg/m^2, $t = -2.19, p < .03$) as well. Although there was significant differences in age, the groups were generally comparable as effect of

age on EDI was generally noted among younger age groups (12-14) but not for older subjects (14-18) (Garner, 1991; Rosen, Silberg & Gross, 1988). Besides, as were the cases of other two studies (Harris & Greco, 1990; Rosen, Silberg & Gross, 1988), age of subjects in this study was not significantly correlated with EDI scores.

For males, athletes showed significantly higher scores on Bulimia ($t = 2.91, p < .01$), Body Dissatisfaction ($t = 2.14, p < .05$) and Maturity Fears ($t = 5.9, p < .001$) than college male students. For females, athletes reported significantly higher level of Interpersonal Distrust ($t = 2.85, p < .01$) and Maturity Fears ($t = 2.64, p = .001$) than college female students. Subjects are classified as "pathologically weight preoccupied" or "at risk" for EDs if they show extreme scores on Drive for Thinness (i.e. ≥ 15) (Garner, 1991; Sungot-Borgen, 1994). For college students, 0% males and 3.3% females were at risk whereas .9% male and 3.3% female athletes were at risk.

As indicated by the scores of the psychological correlates of EDI, athletes of both sexes might be more vulnerable to EDs when compared with the norm. In particular, male athletes may be at higher risk than college students as greater number of them were "weight preoccupied". Besides, they also showed elevated scores on psychological measures that have close relationship with the EDs, namely Bulimia and Body Dissatisfaction.

Foreign Study

Guthrie (1991) administered EDI to 384 athletes from variety of sports (266 males, 158 females) for investigation of their eating disorders. The background of

Table 11. Comparisons of Athletes' Eating Disorders Inventory (EDI) with Norm @

	Chinese Athletes of Present Study				Chinese College Students of Lee et al. (1997) @				Effect
	Male (N = 116)		Female (N = 126)		Male (N = 566)		Female (N = 606)		
	M	SD	M	SD	M	SD	M	SD	
Age	18.9	3.5	17.6	4.2	20.17	1.34	20.2	1.13	a,b
BMI	20.9	2.6	19.0	2.3	20.66	2.38	18.8	1.87	b
Drive for Thinness	1.7	3.1	3.8	4.4	1.63	2.14	3.97	4.13	n.s.
Bulimia	1.1	2.4	1.2	1.9	.43	1.22	1.01	2.17	a
Body Dissatisfaction	8.0	5.2	11.6	6.7	6.86	5.07	11.14	7.05	a
Ineffectiveness	3.9	4.1	4.7	4.8	4.05	3.53	4.64	4.05	n.s.
Perfectionism	5.4	3.8	4.8	3.9	5.45	3.62	4.67	3.73	n.s.
Interpersonal Distrust	3.5	2.9	3.9	3.8	3.16	2.8	2.91	2.89	b
Interoceptive Awareness	2.8	3.8	3.3	4.3	2.11	2.62	2.94	3.6	n.s.
Maturity Fears	7.8	3.7	9.4	4.6	5.5	4.21	6.0	4.18	a, b

Note. "a" represents t-test significance at $p < .05$ for male athletes and college students; "b" represents t-test significance at $p < .05$ for female athletes and college students. n.s = non-significant
@ Norms came from Lee, Lee, Leung and Yu, 1997.

sample was assessed as generally comparable to that of the present study's except that his sample consisted lower percentage of shape/weight dependent sports (6% less). In the present comparison, selected EDI subscales (DT, B, BD) that are believed to be more closely related to eating pathology (Garner, 1991) were chosen for examination.

For males, Chinese athletes subjects of present study reported significantly lower Bulimia (mean difference = .8, $t = -2.5$, $p < .05$) but *higher Body Dissatisfaction* (mean difference = 4.1, $t = 8.93$, $p < .001$) whereas the difference of Drive for Thinness (mean difference = .1, $t = -.3$, $p > .05$) was non-significant. For females, athletes of present study reported lower Drive for Thinness (mean difference = 2.3, $t = -3.79$, $p < .001$) and Bulimia (.6, $t = -2.29$, $p < .05$), but *higher Body Dissatisfaction* (2.7, $t = 3.17$, $p < .01$).

Reasons for Weight Control

Table 12 presents the subjects' mean ratings of contributing factors for their weight control. Only subjects who engaged in any one form of weight control methods were asked to identify factors within the athletic environment that they thought contributed to their use of weight control (53 males, 83 females). Level of contribution for each factor was based on a continuum from "0 = without any relationship at all" to "5 = with a lot of relationship".

Table 12. Athletes' Attribution of their Weight Control

REASONS	Mean Scores		
	Male (N = 53)	Female (N = 83)	Total (N = 136)
Weight loss was required for performance excellence	2.57	2.52	2.54
Weight loss was required to meet a lower wt. class	1.83	1.67	1.73
Weight loss was required to reach aesthetic ideal	2.45	3.21	2.91
The coach had made a remark concerning the need for weight loss	1.68	1.91	1.82
Being required to be weighed in front of the audience	1.43	1.33	1.37
Each member's weight was made public	1.47	1.24	1.33
Being required to reduce the level of body weight in accordance with the coach's desired standard	1.57	1.44	1.49
Being afraid to be kicked off the team for losing no weight	1.66	1.40	1.50
Other members' negative comment on my weight level	1.49	1.63	1.58

Note. Only subjects engaged in any one form of weight control methods were included (N = 136)

Among the male athletes, the statement "weight loss was required for performance excellence" received the highest ratings (mean = 2.57) whereas the female athletes ranked the statement "weight control improved aesthetic ideal" as the most probable reason for their weight control (mean = 3.21). Among the respondents, only 5 males reported that their weight control was totally unrelated to any of the factors specified in the sports environment. This finding suggested factors resided in sports environment encouraged athletes the use of weight control methods but the effect of these factors only fell within the mild to moderate range in affecting their decision.

CHAPTER FOUR: DISCUSSION

Overview

Chinese athletes in the present study demonstrated higher risk for EDs than their non-athlete counterparts but were less risky than Western athletes. Besides, substantial cultural differences between the Western and Chinese athletes in the presentation of EDs were evident. For better understanding of EDs among Chinese athletes, the unique cultural characteristics have to be considered. Hence, the forth coming discussion would be built around a cultural theme, in which comparisons with Western studies would be made. To start with, the general characteristics of the sample and gender difference would be presented. Then, the prevalence and psychological measures of eating disorders as well as factors pertaining to athletes' weight control would be examined. Finally, the limitations of this study and the implications for further studies would be discussed.

The Sample Characteristics

The present study revealed that both male and female athletes are underweight when compare with the local norm (Leung, 1994). Their lower BMI may be the result of athletic training as well as a more restrictive diet or weight control. Whilst male athletes preferred a heavier body built, female athletes wished for a slimmer body figure. Notably, the "ideal" body weight endorsed by the female athletes would push them farther away from the norm, possibly driving them closer to disordered eating. In fact, gender difference of athletes in the pursuit of "ideal" weight actually resembles the

population at large. Pervasive aesthetic norms require females to be slim and males to be more well-built and masculine.

In the present study, female athletes did not differ from their male counterparts in both competition cognitive and somatic anxiety level which was inconsistent with the Western studies (Krane & Williams, 1994; Marten, et al., 1993). Western researchers are contended that females are more open and forthright concerning their feelings, and thus are more willing to reveal emotions that may be perceived as undesirable by their male counterparts. Nonetheless, such claim may be more applicable to state measures of competition anxiety. With the change of physical context or arousal level during the filling in of the questionnaires, different finding may be resulted. The inconsistent finding as depicted might largely due to the fact that the questionnaires for the current study were administered to the athletes during their practice time instead of before their matches as most Western studies did. In a less threatening environment, male athletes may be less defensive and more willing to admit their anxiety as their female counterparts do.

The Prevalence of Eating Disorders

This is the first study in an Asian society surveying the disordered eating behaviors among the athlete population. Clinical level of Anorexia Nervosa and Binge Eating Disorder were not found whereas Bulimia Nervosa was found to be .4% (male = .9% female = 0%). The prevalence was far lower when compared with the Western studies in both BN (male = 14.3%, female = 1.3% -39.2%) and AN (male = 1.6%, female = .8% - 4.2%) (Burckes-Miller & Black, 1988; Sungot-Borgen, 1993a). Yet, similar to the

Western samples, prevalence of BN was higher than AN and BED in both clinical and subclinical levels.

The relatively lower prevalence of EDs among the Chinese athletes in Hong Kong as compared to the Western athletes may be the results of some protective physiological and socio-cultural factors. Biologically, Chinese generally share a lean physique or they are even being classified as underweight if the Western norm is used. In a like manner, Chinese athletes also showed lower BMI than their Western counterparts in both shape/ weight dependent and non-shape/dependent sports (Davis & Cowles, 1989). This finding was contradictory to the general belief that athletes belonging to similar sports type are expected to share similar body build up or physique requirement. As a result, one may deduce that with an already slim body built, the drive to adhere to strict dieting or other more vigorous weight control measures to keep their weight low may be much less. Therefore, the lower BMI of Chinese, athletes and non-athletes, may be one of the reasons why they are generally more protected from developing EDs (Lee, 1993).

Culturally, Chinese have traditionally accepted and even valued a certain degree of fatness which symbolizes a good living. In addition, Chinese also enjoy eating and are sophisticated in food cooking. Stigmatization of fat or overeating is much less. In fact, during social eating occasions, people are encouraged to eat a lot more. Thus, athletes or non-athletes may be less pressurized to engage themselves in a severe form of weight control even if they gain a little weight after a heavy meal. Besides, Chinese meals usually have vegetables as a major component. Those who have gained some weight can easily get back to their original weight by choosing less fatty diet in the following meals.

Customarily, Hong Kong being a small and commercialized place, has placed little effort in the promotion of sports activities. The athletic achievement is generally viewed as less prominent and less important to other aspects of life such as academic success or business accomplishment. As a result, the motivation as well as the pressure for striving for outstanding performance in sports may be relatively lower. At the same time, implication of athletic success in terms of reputation, status, prospect and monetary gains in the Western athletic world is far more substantial than Hong Kong's. Correspondingly, the use of extreme means such as pathological weight control to reach a better performance or sports success is comparatively lower than the situation in the West.

In sum, the combination of biological and socio-cultural factors implies a lower demand or pressure for the Chinese athletes to lose weight in an aggressive manner. This in return makes Chinese athletes more protected from developing EDs than their Western counterparts.

The Relationship of Eating Disorders and Gender

Consistent with the Western studies, the Chinese female athletes in the present study also demonstrated greater risks of developing eating disorders than their male counterparts (Burckes-Miller & Black, 1991; Davis, 1992). Psychologically, female athletes reported stronger drive for thinness and a high level of body dissatisfaction. Most of them also preferred a slimmer body built, a direction totally different from the male athletes. In practice, they also showed more binge eating and used more compensatory weight control methods including excessive exercise and eating low fat food than male athletes.

One possible explanation for the sex difference of EDs in athletic population involves basic biological differences. Generally, males have significantly more lean body mass and less body fat than females especially after puberty (Rolls, Fedoroff, & Guthrie, 1991). As a result, one would predict less of a need for a male athlete to diet to maintain weight and body fat levels that a particular sport might demand. In reverse, females having more fat body tissue may be more prone to weight control.

Disparity between male and female athletes in terms of prevalence rates of eating disorders may also relate to the Westernization process taking place in Hong Kong. In the West, a muscular body built is idealized as strong and masculine for the males while a slim body is portrayed as attractive and fashionable for the females. Besides, media's promotion of slim body for females as an aesthetic standard and sexually attractive seems to be at an increase. Given the greater importance of a female's physical appearance in attaining attractiveness and interpersonal success, it is not surprising that women place much effort in appearance and body built. In parallel, the Chinese traditional belief that a fat body figure for women brings luck and procreation may gradually fade and become less influential as well.

Interestingly, gender difference in the choice of weight control methods demonstrated in the present study was incompatible with the Western studies. Based on their findings, Black and Burckes-Miller (1988) concluded that men tended to use more active methods (vigorous exercises) as opposed to passive methods (severe caloric restriction, fasting, fad diets. self-induced vomiting, and laxatives) which were more commonly used by the female athletes. However, their claim was not applicable to the Chinese samples as the female athletes in the present study reported higher percentage of

both "active" and "passive" methods for weight control. Hence, there may not exist a fix rule in the relationship between sex and weight control methods chosen.

In a nutshell, gender difference in the prevalence of EDs very much reflects the basic biological difference and the aesthetic norm prevailing in Hong Kong. The claim that there was sex difference in the choice of weight control methods in the Western studies might not be applicable in a different cultural context and further exploration is needed.

Factors Pertaining to Weight Control

In General

Participation in modern athletic carries pressure and a number of responsibilities. Under such pressurized environment, athletes attempting to obtain a higher achievement may be more inclined to engage themselves in unhealthy eating or weight control methods in order to maximize of their performance. Therefore, the effects of rank (elite vs. non-elite), sports type (shape/weight dependent) and competition anxiety (high vs. low) that characterize most sports environment were chosen as factors for the investigation of EDs. Subgroup differences may give us a better idea of the role of sports environment in the development of EDs in an athlete. Meanwhile, information was gathered in a more direct format, in which athletes were free to rate factors specific to sports that contribute to their decision of weight control and possibly the development of EDs. Finally, in view of its popularity among the weight control methods, issues of dieting would be presented.

The Subgroup Differences

Rank

The data of the present study indicating that psychological correlates of EDs as measured by EDI (I & ID) were found to be higher for the elite than non-elite athletes. Physically, elite athletes tended to have more binge eating and exercising (for both sexes) and eating more low fat food (for female) than the non-elites (ESC-R). Seemingly, elite athletes tended to have more disordered eating behaviors and psychological correlates of EDs.

Understandably, for elite or professional athletes, sport-related pressure is expected to be more profound. Lucrative contracts, scholarships or approval from peers and coaches definitely heighten the pressure for an outstanding athletic performance. To maximize their performance, they may adopt all means of weight control which include the use of pathological weight control methods.

Sports Types

Western researchers have shown that athletes participating in activities that emphases leanness for better performance or appearance are more prone to the development of EDs (Borgen & Corbin, 1987; Rosen et al, 1986; Yates, 1983). Interestingly, significant difference in most of the psychological and behavioral measures of EDs for shape/weight dependent sports and non shape/weight dependent sports was not found. The only measures found significant were Bulimia (EDI subscale) and binge eating (ESC-R), with athletes in non shape/weight dependent sports showing more problems on both measures.

According to some sports personnel, in the selection of athletes in shape/weight dependent sports like gymnasts, the requirement of body built is rather demanding. Thus,

it is speculated that most athletes belonging to sports that require a lean body built may have a slim physique before they are recruited as team members. Without much effort, they may reach the sports' body requirement naturally. The better body-sports fit may then reduce the need for an extreme weight control and minimize the risk of subsequent binge eating that usually follows after an intensive weight loss.

Meanwhile, athletes in the non-shape/weight dependent sports may experience lesser pressure for a slim built. Without any external restraint, athletes may exert lesser self-control in food intake and end up in more binge eating episodes. To the Chinese, the culture of a strong emphasis on eating may also have a role to play in encouraging episodic overeating especially when there is no particular external restraint.

Competition Anxiety

In the present study, those athletes who reported a higher competition anxiety showed more pathological eating problems, both psychologically (all EDI subscales except IA) and behaviorally on most measures. In particular, it was noticed that there seemed to be a close relationship between binge eating and high competition anxiety. Binge eating in this context might suggest the possibility of emotional eating in which eating is used to regulate negative emotion posed by the demands and stress of the sports like competitions.

Understandably, winning in a competition does not mean everything but is the most important goal to many athletes. In an important athletic event, winning requires not only natural abilities, but also determined efforts of the contestants to achieve the highest standards of performance. It is possible that the quest for a higher standard of

achievement in competitive sports together with the athletes' own determination increase their vulnerability to the development of eating disorders.

As illustrated, among the subgroup divisions (rank, sports type and competition anxiety), the contrast of high and low competition anxiety groups is the most distinctive, showing more significant differences on both psychological and behavioral measures of EDs. This finding may hint that competition anxiety could be a better variant in predicting an athlete's tendency for disordered eating. First, it is a construct which should be rather familiar to almost all athletes and it should be a better estimate of their state of mind when put under pressure. Second, competition anxiety and the resort to disordered eating somehow reflect an athlete's reaction to pressure or external demand for performance. Although they may not be running in parallel totally, they may share similar interweaving psychological process. Nonetheless, further studies were still required to confirm its usefulness as a construct for measuring athletes' vulnerability for EDs.

Contributing factors for weight control

Under a more direct evaluation, among the athletes who engage in any one form of weight control (N = 136), only 5 males reported that their weight control was totally *unrelated* to any of the factors in sports. In other words, to a certain degree, factors embedded in sports environment were related to the endorsement of weight control for most of the athletes. Nevertheless, the contribution of these factors generally fell within the mild to moderate range suggesting the existence of factors other than those in the sports environment in pertaining athletes' weight control.

Sex difference in attributing factors pertaining to their decisions of weight control reflects the strong cultural component of EDs. For the female athletes, the major reason for their weight control was the wish to reach aesthetic ideals whereas the desire for an excellent performance stood out as the dominant attributing factor for the males in weight control. Gender difference in this respect somehow reflects the different sex role expectation the Chinese culture. As depicted, the societal aesthetic norm for women to be attractive is associated with a slim body figure. As for men, they are more expected to have achievement in their careers and likewise in sports performance.

Dieting as a risk factor for EDs

The present study showed that dieting was one of the most popular weight loss methods for the Chinese athletes. Comparing with other forms of weight control methods like fasting, taking laxatives/diuretics, self-induced vomiting, dieting could be considered as relatively less harmful. Nevertheless, its role in leading to possibly more severe forms of eating disorders should not be ignored. In the sports field, athletes with bulimia nervosa almost invariably reported the onset of binge eating following a severe diet (Sungot-Borgen, 1993b). For non-athlete population, it was also evident that dieting is closely linked to the development of disordered eating (Hsu, 1990).

The Psychological Correlates of Eating Disorders (EDI)

The Chinese Athletes and Chinese Norm

Compared to college students, Chinese athletes in the present study showed higher scores on psychological measures that are related to EDs (Lee et al., 1997). Males athletes reported a higher level of bulimia, body dissatisfaction and maturity fears than

the norm. For females, the athletes also showed elevated scores on interpersonal distrust and maturity fears than the non-athletes. In other words, athletes comparatively may also be at a higher risk of EDs as their mind set may be closer to ED patients than norm. The differences may possibly due to athletes' sports participation and the subsequent heightened body awareness and stronger need for weight control. In particular, male athletes might be particularly at risk as they showed elevated scores on subscales that have closer relationship with EDs. That is to say, a male may be psychologically more vulnerable to EDs when he is an athlete than when he is not.

The Chinese Athletes and Western Athletes

Psychologically, the Chinese athletes showed higher body dissatisfaction but their drive for thinness (in particular for the females) and bulimia were lower than their Western counterparts. As indicated, Chinese athletes may experience a stronger negative evaluation of their bodies in a subjective manner. Yet, the driving force for thinness, bulimia and actual weight control practice were much lower than their Western counterparts. This finding denotes that while it is true that dissatisfaction of body parts may lead to a stronger drive for thinness/bulimia, the path does not have to be a direct one. Between body dissatisfaction and more active psychological measures like drive for thinness and bulimia, mediators of some kind may be operating. It was speculated that slimmer physique and a different set of cultural values possessed by Chinese athletes and a less competitive sports environment may serve as buffers even if their dissatisfaction of their bodies is high.

The Chinese Athletes and Eating Disorder Patients

Interestingly, compared to the norm of the combined eating disorder patients (Garner, 1990), all subscales mean scores of the Chinese athletes lied below the clinical range except Maturity Fears. The score of Maturity Fears was only 4.5 for the combined eating disorder patients (Garner, 1990) but it was as high as 8.9 for the Chinese athletes of this study and 5.8 for the Chinese non-athletes (Lee et al, 1997).

Maturity Fears assesses the wish to get retreat to preadolescent security in the face of the demands of adulthood (Garner, 1990). As suggested by Lee et al. (1997), this psychological correlate may be less negatively evaluated by the Chinese society as it denotes a meaning which resembles cultural characteristics. In Chinese families, parents are used to foster an intergenerational dependence instead of a personal autonomy. Thus, the maturation process is more gradual and adolescence is likened to a moratorium without a distinct endpoint. Under such a developmental process, Chinese may be more apt to resort to the preadolescent security that they once feel so securely fastened to in the face of demand or stress. The exceptionally high Maturity Fears among Chinese population at large may reflect a very real cultural characteristic only (Yang, 1995).

In conclusion, some cultural differences in psychological measures of EDs were noted. The elevated body dissatisfaction and maturity fears but lower drive for thinness and bulimia reflect various cultural characteristics of Chinese that may have served as moderators of some kind. Besides, the finding of elevated Maturity Fears among Chinese, both athletes and non-athletes, implies that further work is needed to evaluate the transcultural validity of instrument developed in the West.

Conclusion

To conclude, direct and indirect measures of factors in sports supported the notion that sports environment posed athletes at a higher risk for EDs. As discussed, sports environment actually reflected the strong psychosocial component in the development of EDs. On the one hand, it was speculated that personnel or atmosphere in sports might foster a subculture that encourages weight control to a certain extent. Meanwhile, athletes may also pose themselves a lot of pressure or stress for better performance and willing to use various means including extreme weight control. On the other hand, this tendency for disordered eating may further be aggravated by socio-cultural norm at large. Higher prevalence of EDs and associated psychological problems found among the female and Western athletes reflected the effect of the societal expectations or pressure in shaping EDs. Obviously, the socio-cultural components of the Chinese and the Westerners in shaping the symtomatology of EDs among the athletes are very different. As speculated, the Chinese may be very much protected by mediators such as slimmer body built and cultural values of taking fatness as symbol of luck even though they were rather "dissatisfied" with their own bodies. The minimal feelings of regret or embarrassment towards overeating among the Chinese athlete bingers may also reflect the culture's general acceptance to fatness or indulgent eating.

The Diagnostic Instruments

The Eating Disordered Inventory (EDI) validated in various studies was used in this study to assess the eating disturbances and the associated psychological characteristics of the subjects. Eating Symptom Checklist-Revised (ESC-R), a newly

constructed and revised questionnaire was used to measure the presence of disordered eating behaviors and attitudes and weight control methods. The questionnaire aims at getting a simulated diagnoses and establishing a prevalence figure of eating disorders.

While EDI focus more on the psychological aspects of EDs, items of ESC-R are constructed more for behavioral measures of EDs. In general, the results of the two measures were compatible to each other. Groups of athletes showing more psychological problems on EDI invariably also demonstrated more behavioral problems on similar constructs of ESC-R. Thus, the present study provided preliminary evidence that the ESC-R may be a potentially useful self-report instrument in investigating the behavioral and some attitudinal dimensions of eating disorders among the Chinese population. Nevertheless, its validity would best be established should it be followed by a clinical interview for verification of the information gathered in the self-reported ESC-R.

Limitations

Several limitations of the present study should be noted. First, the data gathered in this study indicated that the athletes tended to be at a higher risk of developing eating pathology than their non-athlete counterparts. Some risk factors resided in sports may have contributed to their weight control and disordered eating. Nevertheless, it was not the scope of the present study to determine the direction of the effects. To explore the existence of casual relationship, longitudinal studies that examine the onset and development of undesirable eating behaviors and attitudes may warrant a better answer.

Second, self-report questionnaires could be very useful for epidemiological studies in large populations but accurate estimates still could not be established without clinical

evaluations. In particular for EDs, it was noted that athletes tended to under-report symptoms when measured in a self-report questionnaire format (Sungot-Borgen, 1993a). As clinical interviews were not conducted, a conservative attitude towards the prevalence of EDs should be taken.

Third, the sample used in the present study was relatively small and rather heterogeneous in terms of sports types. Besides, the majority of the athletes included were at their late adolescent or early adulthood, the age group which is most vulnerable to eating disorders (Hsu, 1990). Thus, the results cannot be generalized to the entire athlete population in Hong Kong. In order to obtain more accurate estimates of the prevalence rates of severe eating disorders, it would be more desirable if a larger sample and matched non-athlete control is to be recruited.

Finally, due to the heterogeneous nature of the athlete population, studies that include a varsity of sports types would be rather unique in its own way. In other words, prevalence and symtomatology of EDs may very much depend on the sample composite, the kind of sports that are included. Thus, it is rather difficult to find a sample that matches the characteristics of the present's, let alone one variable for comparison. The comparisons in the text, therefore, should be taken as a preliminary contrast only.

Implications for Future Studies

As a matter of degree, factors embedded in sports environment might somehow motivate athletes to endorse weight control or exacerbate EDs. Nevertheless, the contributions of these factors generally fell within the mild to moderate range and suggested the existence of factors other than those in the sports environment in pertaining

athletes' weight control. It will be interesting if future studies would explore the interaction of various factors inside and outside sports environment in the contribution to EDs or weight control. In particular, the effects of cultural characteristics as mediators of EDs may worth more exploration.

To determine the prevalence of an disorder, we are in need of a large scale epidemiological study. Nonetheless, most of the time we may not be able to afford clinical interview case by case. Thus, we are in need of a valid instrument in questionnaire form for measuring or screening purpose. As for instruments, the concordance of EDI and ESC-R initially validates the usefulness of ESC-R as a diagnostic tool for eating pathologies. Nevertheless, despite the initial evidence, ECS-R is a relatively new instruments for measuring EDs. More importantly, before its mass application, its validity as a simulated diagnosis of EDs needs to be validated by matching its information with clinical interviews. Further studies in examining the applicability of the Western instruments for EDs as well as developing local ones with local norms are very much in needed.

REFERENCES

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders III, 3rd. Edition. Washington, D.C., 1980.

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders VI, 4th. Edition. Washington, D.C., 1994.

Black, D.R., & Burcke-Miller, M.E. (1988). Male and female college athletes: Use of anorexia nervosa and bulimia nervosa weight loss methods. Research Quarterly for Exercise and Sport, 59,252-256.

Borgen, J., & Corbin. (1987). Eating disorders among female athletes. Physician and Sportsmedicine, 15, 89-95.

Brookes-Gunn, J., Burrow, C., & Warren, M.O. (1988). Attitudes towards eating and body weight in different groups of female adolescent athletes. International Journal of Eating Disorders, 7, 749-757.

Brookes-Gunn, J., Warren, M.P., and Hamilton, L. (1987). The relation of eating problems and amenorrhea in ballet dancers. Medical Science of Sports Exercise, 19, 41-48.

Brown, P.J. & Konner, M. (1987). An anthropological perspective on obesity. Annals of the New York Academy of Sciences, 449, 29-46.

Brownell, K.D., Rodin, J. & Wilmore, J. H (1992). Eating, body weight, and performance in athletes. (pp. 3-14) Philadelphia: Lea & Febiger.

Bruch, H. (1973). Eating disorders. New York: Basic Books.

Buhrich, N. (1981). Frequency of presentation of anorexia nervosa in Malaysia. Australian and New Zealand Journal of Psychiatry, 15, 153-155.

Burckes-Miller, M.E., & Black, D.B. (1988). Male and female college athletes: prevalence of anorexia nervosa and bulimia nervosa. Athletic Training, 23, 137-140.

Button, E.J. & Whitehouse, A. (1981). Subclinial anorexia nervosa. Psychological Medicine, 11, 509-516.

Chopak, J. S. & Taylor-Nicholson, M. (1991) Do female college athletes develop eating disorders as a result of the athletic environment ? In D.R. Black (Ed.) Eating disorders among athletes (pp. 43-66). Reston: American Alliance for Health.

Davis, C., & Cowles, M., (1989). A comparison of weight and diet concerns and personality factors among female athletes and non-athletes, Journal of Psychosomatic Research, 33, 527-536.

Dolan, B. & Ford, K. (1991). Binge eating and dietary restraint: a cross-cultural analysis. International Journal of Eating Disorders, 10, 345-5535.

Dummer, G., Rosen, L., Heusner, W., Roberts, P., & Counsilman, J.(1987). Pathogenic weight-control behaviors of young competitive swimmers. The Physician and Sportsmedicine, 15, 75-84.

Ford, K.A., Dolan, B.M. & Evans, C. (1990). Cultural factors in the eating disorders: a study of body shape preferences of Arab students. Journal of Psychosomatic Research, 34, 501-507.

Garner, D.M. (1991). Eating Disorder Inventory - 2: Professional Manual. LA: Western Psychological Services.

Garner, D.M., Garfinkel, P.E., Rockert, W., and Olmstead., M.P. (1987). A prospective study of eating disturbances in ballet. Psychotherapy Psychosomatic, 48, 170- 182.

Guthrie, S.R. (1991). Prevalence of eating disorders among intercollegiate athletes: contributing factors and preventative measures. In D.R. Black (Ed.) Eating disorders among athletes (pp. 43-66). Reston: American Alliance for Health.

Hamilton, L. H., Brooks-Gunn, J., Warren, M.P. (1985). Sociocultural influences on eating disorders in professional female ballet dancers. International Journal of Eating Disorders, 4, 465-472.

Hansen, N.C. (1978). Wrestling with making weight. The Physician and Sportsmedicine, 27, 10.

Harris, M.B., & Greco, D. (1990). Weight control and weight concern in competitive female gymnasts. Journal of Sport & Exercise Psychology, 12, 427-433.

Herman, C.P., & Polivy, J. (1988). Restraint and excess in dieters and bulimics. In K.M. Pirke, W. Vandereycken, & D. Ploog (Eds.), The psychobiology of bulimia nervosa (pp. 33-41). New York: Springer-Verlag.

Holderness, C.C., Brooks-Gunn, J., & Warren, M.P. (1994). Eating disorders and substance use: a dancing vs. a nondancing population. Medicine and Science in Sports and Exercise, 26, 297-302.

Hsu, L.K. G. (1990). Eating Disorders. New York: Guilford Press.

Johnson, C. & Connors, M.E. (Eds.). (1987). Demographic and clinical characteristics. The etiology and treatment of bulimia nervosa: A biopsychosocial perspective. New York: Basic Books.

Jones, G., Hanton, S., & Swain, A.B. J. (1994). Intensity and interpretations of anxiety symptoms in elite and non-elite sports performers. Personality and Individual Differences, 17, 657-663.

Jones, G. & Swain, A. (1994). Predisposition to experience debilitative and facilitative anxiety in elite and nonelite performers. The Sport Psychologist, 9, 201-211.

Katz, J. L. (1986). Long-distance running, anorexia nervosa, and bulimia: a report of two cases Comprehensive Psychiatry, 27, 74-78.

Khandelwal, S.K. & Saxena. S. (1990). Anorexia nervosa in people Asian extraction. British Journal of Psychiatry, 157, 784.

King, M.B., and Mezey, G. (1987). Eating behavior of male racing jockeys. Psychological Medicine, 17, 249- 253.

Klock, S.C. & DeSouza, M. J. (1995). Eating disorder characteristics and psychiatric symptomatology of eumenorrheic and amenorrheic runners. International Journal of Eating Disorders, 17, 161-166.

Krane, D.M. & Tenebaum, G. (1993). A Practical Application of the Anxiety-Athletic Performance Relationships: The Zone of Optimal Functioning Hypothesis, The Sport Psychologist, 7, 113-126.

Krane, V. & Williams, J.M. (1994). Cognitive anxiety, somatic anxiety, and confidence in track and field athletes: The impact of gender, competitive level and task characteristics. International Journal of Sport Psychology, 25, 203- 217.

Lee, S. (1991). Anorexia nervosa in Hong Kong : A Chinese perspective. Psychological Medicine, 21, 703-711.

Lee, S. (1993). How abnormal is the desire for sliminess ? A survey of eating attitudes and behavioral among Chinese undergraduates in Hong Kong. Psychological Medicine, 23, 437-451.

Lee, S. (1995). Self-starvation in context: Towards a culturally sensitive understanding of anorexia nervosa. Social Science and Medicine, 41, 25-36.

Lee, S., Chiu, H.F.K. & Chen, C. N. (1989). Anorexia nervosa in Hong Kong: why not more in Chinese ? British Journal of Psychiatry, 154, 683-688.

Lee, S., A.M. Lee, T. Leung, H. Yu. (1997). Psychometric properties of the eating disorders inventory (EDI-1) in a nonclinical Chinese population in Hong Kong. International Journal of Eating Disorders, 21, 187-194.

Leung, S. (1994). Growth Index. The Chinese University of Hong Kong and the Department of Health.

Li, S. Y. (1994) Disordered eating behaviors and attitudes among Chinese adolescent girls in Hong Kong: Prevalence and associated psychological features. Unpublished Master Dissertation, Chinese University of Hong Kong.

Marten, R. (1977). Sport Competition Anxiety Test. Champaign, IL: Human Kinetics.

Mumford, D.B., Whitehouse, A.M. & Choudry, I. Y. (1991). Sociocultural correlates of eating disorders among Asian schoolgirls in Bradford. British Journal of Psychiatry, 158, 222-228.

Nuderman, S., Rosen., J.C. & Leitenberg, H. (1988). Dissimilarities in eating attitudes, body image distortion, depression and self-esteem between high-intensity male runners an woman with bulimia nervosa. International Journal of Eating Disorders, 7, 625-634.

Ong, Y. L. & Tsoi, W. F. (1982). A clinical psyhosocial study of seven cases of anorexia nervosa in Singapore. Singapore Medical Journal, 23, 255-261.

Overdorf, V.G. (1991). Eating related problems in female athletes. In D.R. Black (Ed.) Eating disorders among athletes (pp. 43-66). Reston: American Alliance for Health.

Petrie, T.A. (1993). Disordered eating in female collegiate gymnasts: Prevalence and personality/attitudinal correlates. Journal of Sport & Exercise Psychology, 15, 424-436.

Petrie, T.A. , and Stoever, S. (1993). The Incidence of bulimia nervosa and pathogenic weight control behaviors in female collegiate gymnasts. Research Quarterly for Exercise and Sport, 64, 238- 241.

Rolls, B.J., Fedoroff, I.C., & Guthrie, J.F. (1991). Gender differences in eating behavior and body weight regulation. Health Psychology, 10, 133-142.

Rosen, L.W., & Hough, D.O.(1988). Pathogenic weight-control behaviors of female Gymnasts. The Physician and Sport Medicine, 16, 141-144.

Rosen, L.W., Mckeag, D.B., Hough, D.O., Curley, V.(1986). Pathogenic weight-control behavior in female athletes. The Physician and Sport Medicine, 14, 79-85.

Rosen, L.W. & Silberg, N.T. & Gross, J. (1988). Eating Attitudes Test and Eating Disorders Inventory: Norms for adolescent girls and boys. Journal of Consulting and Clinical Psychology, 56, 305-308.

Siegel, A.J., Stewart, E.L., & Barone, B. (1990). Body image assessment and eating attitudes in marathon Runners: Inverse findings to patients with anorexia nervosa. Journal of Sports Medicine, 5, 67-70.

Steens, S.N., and Brownell, K.D. (1990). Current patterns of weight loss and regain in wrestlers: Has the tradition changed ? Medical Science and Sports Exercises, 22, 762- 773.

Stoutjesdyk, D., & Jenve, R. (1993). Eating disorders among high performance Athletes. Journal of Youth and Adolescence, 22, 271-282.

Sundgot-Borgen, J. & Corbin, C.B. (1987). Eating disorders among female athletes. The Physician and Sportsmedicine, 15, 89-95.

Sundgot-Borgen, J. (1993). Prevalence of eating disorders in elite female athletes. International Journal of Sport Nutrition, 3, 29-40.

Sungot-Borgen, J. (1994). Risk and trigger factors for the development of eating disorders in female elite athletes. Medicine and Science in Sports and Exercise, 27, 414-419.

Taub, D.E., & Benson, R.A. (1992). Weight concerns, weight control techniques, an eating disorders among adolescent competitive swimmers: The effect of gender. Sociology of Sport Journal, 9, 76-86.

Thelen, M.H., Mann, L.M., Pruitt, J., & Smith, M. (1987). Bulimia: Prevalence and component factors in college women. Journal of Psychosomatic Research, 31, 73-78.

Thiel, A., Gottfried, H., Hesse, F. W. (1993). Subclinical eating disorders in male athletes, Acta Psychiatrica Scandinavica, 88, 259-265.

Tseng, M.C., Lee M.B. & Lee, Y. J. (1989). A clinical study of Chinese patients with eating disorders. Chinese Psychiatry, 3, 17-28.

Warren, B.J., Stanton, A.L., & Blessing, D.L. (1989). Disordered Eating Patterns in Competitive Female Athletes. International Journal of Eating Disorders, 19, 565-569.

Weight, L.M., and Noakes, T.D. (1987). Is running an analog of anorexia ? A survey of the incidence of eating disorders in female distance runners. Medical Science Sports Exercise, 19, 213- 232.

Wilkins, J.A., Boland, F.J., & Albinson, J. (1991). A Comparison of male and female university athletes and nonathletes on eating disorder indices: Are athletes protected ? Journal of Sport Behavior, 14, 129- 143.

William, G.J., Power, K.G., Millar, H.R., Freeman, C.P., Yellolees, A., Dowds, T., Walker,M., Campsie, MacPherson, F., Jackson, M.A. (1993). Comparison of eating disorders and other dietary/weight groups on measures of perceived control, assertiveness, self-esteem, and self-directed hostility. International Journal of Eating Disorders, 14, 27-32.

Williamson, D.A., Netemeyer, R.G., Jackman, L.P., Anderson, D.A., Funsch, C.L. & Rabalais, J.Y. (1995). Structural equation modeling of risk factors for the development of eating disorder symptoms in female athletes. International Journal of Eating Disorders, 17 , 387-393.

Yang, K.S. (1995). Chinese social orientation: An integrative analysis. In T. Y. Lin, W.S. Tseng, & E.K. Yeh (Eds.), Chinese societies and mental health (pp. 19- 39). Hong Kong : Oxford University Press.

Yates, A., Leehey, K., & Shisslak, C.M. (1983). Running- an analogue of anorexia ? The New England Journal of Medicine, 308, 251-255.

Zukerman, D.M., Colby, A., Ware, N.C., Lazerson, J.S. (1986). The prevalence of bulimia among college students. American of Public Health, 76, 1135-1137.

Appendices

APPENDIX A
BASIC INFORMATION

運動員飲食習慣調查

這是一份研究運動員飲食習慣調查的問卷，目的在了解運動員的飲食態度及他們的身心健康狀況；希望你能合作，按自己的眞實情況及感受填寫這份問卷。所有資料絕對保密，只會作研究之用。　　多謝合作！

個人資料

1. 年齡：_____

2. 性別：_____

3. 職業：_____

4. 教育程度：_____

5. 你現在主要從事那一項運動。

（一）田類（註:_____）
（二）徑類（註:_____）
（三）划艇
（四）球類（註:_____）
（五）游泳
（六）單車
（七）柔道
（八）摔角
（九）賽馬
（十）體操（註:_____）
（十一）舞蹈
（十二）其他：_____

6. 你在這項運動的年數約爲：___ 年

7. 在同隊中你對自己的評核是：

（一）	（二）	（三）	（四）	（五）	（六）	（七）
初級			中級			資深級

8. 現時體重：_____（磅）或 _____(千克)

9. 身高：_____ (尺)_____(吋) 或 _____(厘米)

10. 以往最高的體重是 _____（磅）或 _____(千克)

11. 以往最低的重量是 _____（磅）或 _____(千克)

12. 你對自己的體重是否感到滿意 ？

□1）十分不滿意　□2）不滿意　□3）滿意　□4）十分滿意

13. 你的理想體重是多少？_____（磅）或 _____(千克)

APPENDIX B

COMPETITIVE STATE ANXIETY INVENTORY-2 (CSAI-2)

14. 以下是一些運動員在比賽前的狀況，請按你個人的情況：

(1) 選出（ v ）你的同意程度;

(2) 評估你所經歷的賽前狀況對你的影響,並將指數填寫於空格上。

影響程度	有極之壞的影響	有非常壞的影響	有壞影響	沒影響	有幫助	十分有幫助	極之有幫助
指數	-3	-2	-1	0	+1	+2	+3

	從不 (1)	少許 (2)	普通 (3)	很多 (4)	指數
比賽前我大都會有以下的表現.....					
a. 我的心情感到緊張	□	□	□	□	_____
b. 我的胃部感到緊張	□	□	□	□	_____
c. 我的手部濕冷	□	□	□	□	_____
d. 我擔心我會失敗	□	□	□	□	_____
e. 我感到疑慮	□	□	□	□	_____
f. 我的心跳加速	□	□	□	□	_____
g. 我重視是次的比賽	□	□	□	□	_____
h. 我的身體感到收緊	□	□	□	□	_____
i. 我擔心我的目標能否達到	□	□	□	□	_____
j. 我的身體感到輕鬆	□	□	□	□	_____
k. 我擔心自己未能集中精神	□	□	□	□	_____
l. 我感到焦慮	□	□	□	□	_____
m. 我擔心我未能作出應有的表現	□	□	□	□	_____
n. 我感到胃部下沉	□	□	□	□	_____
o. 我擔心在壓力下我會氣喘	□	□	□	□	_____
p. 我擔心表現不佳	□	□	□	□	_____
q. 我的身體感到緊張	□	□	□	□	_____
r. 我擔心別人會因我的表現而感到失望	□	□	□	□	_____

APPENDIX C

EATING DISORDERS INVENTORY (EDI)

請細心閱讀下列各題，並選出（ v ）最適合你的情況。

	1 恆 常	2 通 常	3 常 常	4 間 中	5 很 少	6 從 不
1．我會因吃糖或澱粉類食物而感到不安。	□	□	□	□	□	□
2．我認爲我的肚腩太大。	□	□	□	□	□	□
3．我希望可以重獲童年的安全感。	□	□	□	□	□	□
4．我心煩時便會進食。	□	□	□	□	□	□
5．我常吃得太飽。	□	□	□	□	□	□
6．我希望可以年輕一點。	□	□	□	□	□	□
7．我考慮節食。	□	□	□	□	□	□
8．當我的情緒太強烈時，我會感到害怕。	□	□	□	□	□	□
9．我認爲我的大腿太粗。	□	□	□	□	□	□
10．我覺得自己是一個無能力的人。	□	□	□	□	□	□
11．食得太多之後，我會極度內疚。	□	□	□	□	□	□
12．我認爲我的腰圍恰到好處。	□	□	□	□	□	□
13．在我家裏，只有極之突出的表現才算是好的表現。	□	□	□	□	□	□
14．童年是人生中最快樂的時期。	□	□	□	□	□	□
15．我能坦率地表達自己的感受。	□	□	□	□	□	□
16．我極度害怕增磅。	□	□	□	□	□	□
17．我信任別人。	□	□	□	□	□	□
18．我感到孤獨。	□	□	□	□	□	□
19．我對自己的體型感到滿意。	□	□	□	□	□	□
20．我覺得自己大致上能掌握生活中遇到的事情。	□	□	□	□	□	□
21．我不清楚自己的感受。	□	□	□	□	□	□
22．我寧願做一個成人也不做小孩。	□	□	□	□	□	□
23．我很容易跟別人溝通。	□	□	□	□	□	□
24．我希望我是另一個人。	□	□	□	□	□	□
25．我誇大了體重的重要性。	□	□	□	□	□	□
26．我清楚認識自己的感受。	□	□	□	□	□	□
27．我覺得自己是個不中用的人。	□	□	□	□	□	□
28．我曾暴食到有欲罷不能的感覺。	□	□	□	□	□	□
29．小時候我盡力避免使父母和老師失望。	□	□	□	□	□	□
30．我有要好的知己朋友。	□	□	□	□	□	□
31．我喜歡我臀部（屁股）的線條。	□	□	□	□	□	□
32．我常想著要再瘦一點。	□	□	□	□	□	□
33．我不清楚自己內心的感受。	□	□	□	□	□	□
34．我很難向別人表達自己的感受。	□	□	□	□	□	□

	1 恆 常	2 通 常	3 常 常	4 間 中	5 很 少	6 從 不
35．成年人要負的責任實在太大。	□	□	□	□	□	□
36．我會因做事不能做到最好而感到很不高興。	□	□	□	□	□	□
37．我對自己有安全感。	□	□	□	□	□	□
38．我想大吃一頓（一次過吃很多東西）。	□	□	□	□	□	□
39．我高興自己不再是小孩。	□	□	□	□	□	□
40．我攪不清自己到底是不是肚餓。	□	□	□	□	□	□
41．我對自己的評價很低。	□	□	□	□	□	□
42．我覺得我能達到自己的標準。	□	□	□	□	□	□
43．我的父母期望我有優秀的表現。	□	□	□	□	□	□
44．我擔心我不能控制自己的感受。	□	□	□	□	□	□
45．我認爲我的坐圍太粗。	□	□	□	□	□	□
46．在別人面前，我會適量地進食；當他們離去後，我便會盡情大吃。	□	□	□	□	□	□
47．吃普通份量的食物後我會感到飽脹。	□	□	□	□	□	□
48．我覺得人在童年時期是最快樂的。	□	□	□	□	□	□
49．若果我的體重增加一磅，我便會擔心自己會不停地增磅下去。	□	□	□	□	□	□
50．我覺得自己是個有價值的人。	□	□	□	□	□	□
51．心煩的時候，我分不清自己是悲哀，害怕，還是憤怒。	□	□	□	□	□	□
52．我覺得我做事一定要做到十全十美，否則便不要做。	□	□	□	□	□	□
53．我想過用嘔吐的方法去減磅。	□	□	□	□	□	□
54．我需要跟別人保持一段距離（若有人太接近我，我便會感到不安）。	□	□	□	□	□	□
55．我認爲我的大腿不大不細，恰到好處。	□	□	□	□	□	□
56．我內心感到空虛。	□	□	□	□	□	□
57．我可以與別人談及個人的想法和感受。	□	□	□	□	□	□
58．一生中最好的歲月是在你成爲成年人之後。	□	□	□	□	□	□
59．我認爲我的臀部（屁股）太大。	□	□	□	□	□	□
60．我有些感覺是難以形容的。	□	□	□	□	□	□
61．我會偷偷地飲食。	□	□	□	□	□	□
62．我認爲我的坐圍尺碼恰到好處。	□	□	□	□	□	□
63．我有極高的目標。	□	□	□	□	□	□
64．當我心情煩亂時，我擔心自己會開始進食。	□	□	□	□	□	□

APPENDIX D

EATING SYMPTOMS CHECKLIST-REVISED (ESC-R)

在最近九個月之內.....

1. 我曾在短時間內(例如:在兩小時內)進食一般人都認爲過量的食物。

□1） 從未試過 * □2） 一星期少於一次 □3） 一星期一次

□4） 一星期二至三次 □5） 一星期四至五次 □6） 差不多每天如是

若從未試過, 請跳往第4題

2. 這樣進食時, 我會感到不能停止進食, 或不能控制自己所吃的東西和份量。

□1） 從未試過 * □2） 一星期少於一次 □3） 一星期一次

□4） 一星期二至三次 □5） 一星期四至五次 □6） 差不多每天如是

若從未試過, 請跳往第4題

3. 在以上的進食情況下, 我常有以下的經歷：

a. 吃得比平常更快 □1）十分不對 □2）不對 □3）對 □4）十分對

b. 飽到不適才停止進食 □1）十分不對 □2）不對 □3）對 □4）十分對

c. 不覺饑餓但仍大量進食 □1）十分不對 □2）不對 □3）對 □4）十分對

d. 爲進食份量感到尷尬而獨自進食 □1）十分不對 □2）不對 □3）對 □4）十分對

e. 過度進食後討厭自己, 沮喪或感到內咎 □1）十分不對 □2）不對 □3）對 □4）十分對

4. 我的體重或身型比較我其他方面(例如在工作上的表現, 或與其他人相處來說)對我看自己或評價自己：

□1) 完全沒有影響 □2) 有一些影響 □3) 有影響

□4) 有很大影響 □5) 有十分大的影響

5. 體重或身型問題令我感到十分困擾煩腦。

□1）十分不對 □2）不對 □3）對 □4）十分對

6. 很多人都說我的體重過低，但我仍想減肥。

□1）十分不對 □2）不對 □3）對 □4）十分對

7. 我的體重在一個月內最多曾下跌：

□1）少於4磅 □2）4－7磅 □3）8－11磅

□4）12－20磅 □5）20磅以上

8. 爲了減肥, 我曾吃低脂食物。

□1） 從未試過 □2） 一星期少於一次 □3） 一星期一次

□4） 一星期二至三次 □5） 一星期四至五次 □6） 差不多每天如是

9. 雖然我的體重較正常低出十磅或以上，我不認爲我有體重的問題。
□1）十分不對　□2）不對　□3）對　□4）十分對

10. 爲了減肥，我曾節食。
□1） 從未試過　□2） 一星期少於一次　□3） 一星期一次
□4） 一星期二至三次　□5） 一星期四至五次　□6） 差不多每天如是

11. 我曾使用瀉藥或利尿劑去控制體重。
□1） 從未試過　□2） 一星期少於一次　□3） 一星期一次
□4） 一星期二至三次　□5） 一星期四至五次　□6） 差不多每天如是

12. 我的體重在一個月內最多曾增加：
□1）少於4磅　□2）4－7磅　□3）8－11磅
□4）12－20磅　□5）20磅以上

13. 爲了減肥我曾服用減肥藥物(例如減肥丸、減肥茶)。
□1） 從未試過　□2） 一星期少於一次　□3） 一星期一次
□4） 一星期二至三次　□5） 一星期四至五次　□6） 差不多每天如是

14. 雖然我的體重較正常低出十磅或以上，我仍然極之懼怕體重增加。
□1）十分不對　□2）不對　□3）對　□4）十分對

15. 爲了減肥我曾特別做運動多過一小時。
□1） 從未試過　□2） 一星期少於一次　□3） 一星期一次
□4） 一星期二至三次　□5） 一星期四至五次　□6） 差不多每天如是

16. 我刻意將吞下的食物嘔出，以避免增磅。
□1） 從未試過　□2） 一星期少於一次　□3） 一星期一次
□4） 一星期二至三次　□5） 一星期四至五次　□6） 差不多每天如是

17. 爲了減肥，我曾禁食 24 小時或以上。
□1） 從未試過　□2） 一星期少於一次　□3） 一星期一次
□4） 一星期二至三次　□5） 一星期四至五次　□6） 差不多每天如是

18.（只適合女性作答）你的經期是否準確?
□1）十分不準確　□2）不準確　□3）大致準確　□4）十分準確

19.（只適合女性作答）你上次月經是在多久以前?
□1）在過去一個月內　□2）在過去兩個月內　□3）在過去四個月內
□4）在過去六個月內　□5）不在過去六個月內　□6）從未試過有月經

APPENDIX E

SURVEY FOR CONTRIBUTING FACTORS OF ATHLETES' WEIGHT CONTROL

20. 在運動環境中，某些因素可能會促使運動員使用一些方法去控制體重/減肥，請圈(0)出最適合你的情況 。(若從未使用過任何減肥方法， 可不用填寫)

我減肥是因爲.....

	完全沒有關係	少許關係	有關係	頗有關係	非常有關係
(一) 減肥有助出色表現	1	2	3	4	5
(二) 減肥有助進入較低體重級別	1	2	3	4	5
(三) 減肥有助美態	1	2	3	4	5
(四) 教練/導師提示我要減肥	1	2	3	4	5
(五) 我需要在別人面前磅重 (例如:隊員)	1	2	3	4	5
(六) 每個隊員的體重都是公開的	1	2	3	4	5
(七) 我需要按教練/導師的標準去減低脂肪	1	2	3	4	5
(八) 如果我不控制體重,我害怕會被踢出隊伍	1	2	3	4	5
(九) 其他隊員批評我的體重/體型	1	2	3	4	5
(十) 其他 (請註明:_____)	1	2	3	4	5

全卷完, 謝謝

APPENDIX F: ENGLISH VERSION OF THE QUESTIONNAIRE

BASIC INFORMATION

Thank you for completing this questionnaire. Please circle the appropriate number or response.

1. Age: _____ 2. Sex: _____

3. Occupation: _____ 4. Education: _____

5. You are participating in which kind of sports:

(a) Track
(b) Field
(c) Rowing
(e) Ball games (please specify: _____)
(f) swimming
(g) cycling
(h) judo
(i) wrestling
(j) jockey
(k) gymnastics
(l) dancing (please specify: _____)
(m) others (please specify: _____)

6. You have been participating in this sports for how many years ? _____ year(s).

7. Compare to other team members in your own team, the rating of your performance is:

_____

1 2 3 4 5 6 7

Junior Medium Senior

8. Current Body Weight: _____ (kg) or _____ (lb.)

9. Current Height: _____ (kg) or _____ (lb.)

10. Maximum Body Weight: _____ (kg) or _____ (lb.)

11. Minimum Body Weight: _____ (kg) or _____ (lb.)

12. Are you satisfied with you current weight ?

1. Very dissatisfied
2. Dissatisfied
3. Satisfied
4. Very satisfied

13. Ideal Body Weight: _____ (kg) or _____ (lb.)

COMPETITIVE STATE ANXIETY INVENTORY- 2 (CSAI-2)

14. Below is the state that some of the athletes may experience before the competition, please circle the appropriate number. Please also write the index on the line to indicate the effects of the state on you.

Effects	Extremely Negative	Very Negative	Negative	None at all	Positive	Very Positive	Extremely Positive
Index	-3	-2	-1	0	+1	+2	+3

Before the competition, I usually have the following responses....

	Not at all	Some what	Mode-rarely so	Very Much so	Index of effects
a. I feel nervous	1	2	3	4	___
b. I feel tense in my stomach	1	2	3	4	___
c. My hands are clammy	1	2	3	4	___
d. I am concerned about losing	1	2	3	4	___
e. I have self-doubts	1	2	3	4	___
f. My heart is racing	1	2	3	4	___
g. I am concerned about this competition	1	2	3	4	___
h. My body feels tense	1	2	3	4	___
i. I am concerned about reaching my goal	1	2	3	4	___
j. My body feels relax	1	2	3	4	___
k. I am concerned about reaching my goal	1	2	3	4	___
l. I feel jittery	1	2	3	4	___
m. I am concerned that I may not do as well in this competition as I could	1	2	3	4	___
n. I feel my stomach sinking	1	2	3	4	___
o. I am concerned about choking under pressure	1	2	3	4	___
p. I am concerned about performing poorly	1	2	3	4	___
q. My body feels tight	1	2	3	4	___
r. I am concerned that others will be disappointed with my performance	1	2	3	4	___

EATING DISORDER INVENTORY (EDI)

1 = Always 2 = Usually 3 = Often 4 = Sometimes 5 = Rarely 6 = Never

1. I eat sweets carbohydrates without feeling nervous	1 2 3 4 5 6
2. I think that my stomach is too big	1 2 3 4 5 6
3. I wish that I could return to the security of childhood	1 2 3 4 5 6
4. I eat when I am upset	1 2 3 4 5 6
5. I stuff myself with food	1 2 3 4 5 6
6. I wish that I could be younger	1 2 3 4 5 6
7. I think about dieting	1 2 3 4 5 6
8. I get frightened when my feelings are too strong	1 2 3 4 5 6
9. I think that my thighs are too large	1 2 3 4 5 6
10. I feel ineffective as a person	1 2 3 4 5 6
11. I feel extremely guilty after overeating	1 2 3 4 5 6
12. I think that my stomach is just the right size	1 2 3 4 5 6
13. Only outstanding performance is good enough in my family	1 2 3 4 5 6
14. The happiest time in life is when you are a child	1 2 3 4 5 6
16. I am terrified of gaining weight	1 2 3 4 5 6
17. I trust others	1 2 3 4 5 6
18. I feel alone in the world	1 2 3 4 5 6
19. I feel satisfied with the shape of my body	1 2 3 4 5 6
20. I feel generally in control of things in my life	1 2 3 4 5 6
21. I get confused about what emotion I am feeling	1 2 3 4 5 6
22. I would rather be an adult than a child	1 2 3 4 5 6
23. I can communicate with other easily	1 2 3 4 5 6
24. I wish I were someone else	1 2 3 4 5 6
25. I exaggerate or magnify the importance of weight	1 2 3 4 5 6
26. I can clearly identify what emotion I am feeling	1 2 3 4 5 6
27. I feel inadequate	1 2 3 4 5 6
28. I have gone on eating binges where I felt that I could not stop	1 2 3 4 5 6
29. As a child, I tried very hard to avoid disappointing my parents and teachers	1 2 3 4 5 6
30. I have close relationships	1 2 3 4 5 6
31. I like the shape of my buttocks	1 2 3 4 5 6
32. I am preoccupied with the desire to be thinner	1 2 3 4 5 6
33. I don't know what's going on inside me	1 2 3 4 5 6

34. I have trouble expressing my emotions to others	1 2 3 4 5 6
35. The demands of adulthood are too great	1 2 3 4 5 6
36. I hate being less than best at things	1 2 3 4 5 6
37. I feel secure about myself	1 2 3 4 5 6
38. I think about bingeing (overeating)	1 2 3 4 5 6
39. I feel happy that I am not a child anymore	1 2 3 4 5 6
40. I get confused as to whether or not I am hungry	1 2 3 4 5 6
41. I have a low opinion of myself	1 2 3 4 5 6
42. I feel that I can achieve my standards	1 2 3 4 5 6
43. My parents have expected excellence of me	1 2 3 4 5 6
44. I worry that my feelings will get out of control	1 2 3 4 5 6
45. I think my hips are too large	1 2 3 4 5 6
46. I eat moderately in front of others and stuff myself when they are gone	1 2 3 4 5 6
47. I feel bloated after eating a normal meal	1 2 3 4 5 6
48. I feel that people are happiest when they are children	1 2 3 4 5 6
49. If I gained a pound, I worry that I will keep gaining	1 2 3 4 5 6
50. I feel that I am a worthwhile person	1 2 3 4 5 6
51. When I am upset, I don't know if I am sad, frightened, or angry	1 2 3 4 5 6
52. I feel that I must do things perfectly or not do them at all	1 2 3 4 5 6
53. I have the thought of trying to vomit in order to lose weight	1 2 3 4 5 6
54. I need to keep people at certain distance (feel uncomfortable if someone tries to get too close)	1 2 3 4 5 6
55. I think that my thighs are just the right size	1 2 3 4 5 6
56. I feel empty inside (emotionally)	1 2 3 4 5 6
57. I can talk about personal thoughts or feelings	1 2 3 4 5 6
58. The best years of your life are when you become an adult	1 2 3 4 5 6
59. I think my buttocks are too large	1 2 3 4 5 6
60. I have feelings I can't quite identify	1 2 3 4 5 6
61. I eat or think in secrecy	1 2 3 4 5 6
62. I think that my hips are just the right size	1 2 3 4 5 6
63. I have extremely high goals	1 2 3 4 5 6
64. When I am upset, I worry that I will start eating	1 2 3 4 5 6

EATING SYMPTOMS CHECKLIST- REVISED (ESC-R)

In the recent nine months....

1. Did you often eat within any two-hour period what most people would regard as unusually large amount of food ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

If "Never", go to question 4

2. During the times when you ate this way, did you often feel you couldn't stop eating or control what or how you were eating ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

If "Never", go to question 4

3. Did you usually have any of the following experiences during these occasions ?

(1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly Disagree)

a. Eating much more rapidly than usual 1 2 3 4

b. Eating until you felt uncomfortably full 1 2 3 4

c. Eating large amounts of food when you didn't feel physically hungry 1 2 3 4

d. Eating alone because you were embarrassed by how you were eating 1 2 3 4

e. Feeling disgusted with yourself, depressed, or feeling very guilty after overeating 1 2 3 4

4. How did your weight or shape in affecting how you feel about or evaluate yourself as a person, compared to other aspects of your life such as how do you do at work or how do you get along with other people ?

a. With no effect at all b. With a little effect c. With some effect

d. With quite some effect e. With a lot of effect

5. Problems of body weight or shape have bothered you a lot

a. Very Untrue b. Untrue c. True d. Very True

6. Even though a lot of people commented that you was underweight, you still wish to lose weight

a. Very Untrue b. Untrue c. True d. Very True

7. Within a month's time. your weight has dropped to:

a. Less than 4 lb. b. 4-7 lb. c. 8-11 lb. d. 12 - 20 lb. e. 20 lb. or above

8. Did you ever take low fat diet in order to lose weight ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

9. Although my weight was 10 pounds below normal, I did not think that I have weight problem

a. Very Untrue b. Untrue c. True d. Very True

10. Did you ever diet in order to lose weight ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

11. Did you ever take laxatives or diuretics in order to lose weight ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

12. Within a month's time, your weight has increased to:

a. Less than 4 lb. b. 4-7 lb. c. 8-11 lb. d. 12 - 20 lb. e. 20 lb. or above

13. Did you ever take drugs (e.g. diet pills or diet tea) in order to lose weight ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

14. Although my weight was 10 pounds below normal, I was afraid of weight gain.

a. Very Untrue b. Untrue c. True d. Very True

15. Did you ever exercise for more than an hour in order to lose weight ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

16. Did you ever employ self-induced vomiting in order to lose weight ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

17. Did you ever fast at least 24 hours in order to lose weight ?

a. Never b. Less than once per week c. Once per week d. Twice to Triple per week e. Four to Five times week f. Almost daily

18. (For females only) Was your menstruation accurate ?

a. very inaccurate b. rather inaccurate c. rather accurate d. very accurate

19. (For females only) When was your last menstruation ?

a. within the past one month b. within the past two months c. within the past four months d. within the past six months e. not within the past six months f. never have menstruation

SURVEY OF ATHLETES' ATTRIBUTION OF THEIR WEIGHT CONTROL

Please assess if the following sports related situations affect your use of weight control methods.

1 = Without any relationship
2 = A little relationship
3 = With some relationship
4 = With quite some relationship
5 = With a lot of relationship

1. Weight loss was required for performance excellence	1 2 3 4 5
2. Weight loss was required to meet a lower weight class	1 2 3 4 5
3. Weight loss was required to reach aesthetic ideal	1 2 3 4 5
4. The coach had made a remark concerning the need for wt. loss	1 2 3 4 5
5. Being required to be weighed in front of the audience	1 2 3 4 5
6. Each member's weight was made public	1 2 3 4 5
7. Being required to reduce the level of body weight in accordance with the coach's desired standard	1 2 3 4 5
8. Being afraid to be kicked off the team for losing no weight	1 2 3 4 5
9. Other members' negative comment on my weight level	1 2 3 4 5
10. Others: please specify _____	1 2 3 4 5

-The End-

APPENDIX G
OPERATIONAL DEFINITIONS OF EATING BEHAVIORAL CATEGORIES:

AN
a. Refusal to maintain body weight at or above a minimally normal weigh for age and height [15% below expected: i.e. item 9 $\geq$ 4 (verified by current BMI reported) & item 14 $\geq$ 4]
b. Intense fear of gaining weight or becoming fat, even though underweight (i.e. item 6 $\geq$ 4)
c. Self evaluation being unduly influenced (i.e. item 4 $\geq$ 4)
d. Absence of three consecutive menstrual cycles (i.e. item 19 $\geq$ 3 and $\neq$ 6)

BN
a. Overeating (i.e. Item 1 $\geq$ 4)
b. Uncontrollable [i.e. Item 2 $\geq$ 4 (qualifier: 3 a/ b/ c/ d, either one of them must be $\geq$ 3)]
c. Engage in any one form of weight control method (i.e. items 10, 11, 13, 15, 16 or 17 $\geq$ 4)
d. Self evaluation being unduly influenced (i.e. items 4 $\geq$ 4)

BED
a. Overeating (i.e. Item 1 $\geq$ 4)
b. Uncontrollable [i.e. Item 2 $\geq$ 4 (qualifier: 3a/ b/ c/ d , either one of them must be $\geq$ 3)]
c. none of the weight control methods are used (i.e. item 10, 11, 13, 15, 16 and 17 = 1)
d. marked distress after binge (3e $\geq$ 4)

Subclinical AN
a. Refusal to maintain body weight at or above a minimally normal weigh for age and height [15% below expected: i.e. item 9 $\geq$ 4 (verified by current BMI reported) & item 14 $\geq$ 4]
b. Intense fear of gaining weight or becoming fat, even though underweight (i.e. item 6 $\geq$ 4) or c. self evaluation being unduly influenced (i.e. item 4 $\geq$ 4)
d. Absence of one or three consecutive menstrual cycles (i.e. item 19 $\geq$ 2 and $\neq$ 6)

Subclinical BN
a. Overeating (i.e. Item 1 $\geq$ 3
b. Uncontrollable [i.e. Item 2 $\geq$ 3 (qualifier: 3a/ b/ c/ d , any one of them $\geq$ 3)]
c. Any one form of weight control method (i.e. items 10, 11, 13, 15, 16, 17 $\geq$ 3)
d. Psychological distress or undue self evaluation not required

Subclinical BED
a. Overeating (i.e. Item 1 $\geq$ 3)
b. Uncontrollable [i.e. Item 2 $\geq$ 3 (qualifier: 3a/ b/ c/ d , any one of them $\geq$ 3)]
c. None of the weight control methods are required
d. Distress after binge (i.e. 3e $\geq$ 3)